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Tucson Electric Power Company
One South Church, Post Office Box 711
Tucson, Arizona 85702

April 13, 2007

Docket Control
Arizona Corporation Commission
1200 West Washington Street
Phoenix, AZ 85007

Re: Compliance Filing due pursuant to A.A.C. R14-2-1618, paragraph D
Docket No. **RE-00000C-00-0377**, Decision No. 63486

Docket Control:

Tucson Electric Power Company is required by A.A.C. R14-2-1618, paragraph D to file reports on sales and portfolio power demonstrating the output of portfolio resources, the installation date of portfolio resources, and the transmission of energy from those portfolio resources to Arizona consumers. Please find enclosed an original and thirteen copies of the required reports for the year ending 2006. Also enclosed is an additional copy of the filing that the Company requests you date-stamp and return in the self-addressed, stamped envelope for our files.

If you have any questions, please do not hesitate to contact me at (520) 884-3680.

Sincerely,

Jessica Bryne

Jessica Bryne
Regulatory Services

Cc: Brian Bozzo, ACC
Carmela Leon, ACC

Tucson Electric Power Company

ENVIRONMENTAL PORTFOLIO STANDARD YEAR-END 2006

APRIL 2007

A UniSource Energy Company
P.O. Box 711
Tucson, Arizona 85702

RENEWABLES PROGRESS REPORT
YEAR END 2006

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ENVIRONMENTAL PORTFOLIO STANDARD PROGRAMS

EXECUTIVE SUMMARY

The ACC has mandated under the Environmental Portfolio Standard ("EPS"), R14-2-1618, that any Load Serving Entity shall derive a percentage of its total retail energy sold from new solar resources or environmentally-friendly renewable electricity technologies whether that energy is purchased or generated by the seller. The percentage changes each year, increasing to a maximum of 1.1% in 2007 and remaining the same through the life of the standard. In 2006 the percentage is 1.05% of which at least 60% must be derived from solar electric generation.

At the Arizona Corporation Commission Staff ("Staff") meeting on January 6, 2004, the Commissioners directed Staff to hold a series of workshops to consider four issues related to the Environmental Portfolio Standard Rules (A.A.C. R14-2-1618). The four issues identified by the Commissioners were:

1. A discussion of increasing Environmental Portfolio Standard ("EPS") funding levels.
2. Elimination of the EPS expiration date.
3. Restoration of Demand Side Management ("DSM") funding.
4. Allocation of funding among various technologies.

Staff commenced the workshop series on March 5, 2004. The last and Fifth Workshop was June 25, 2004. A Staff report proposing changes to the EPS was issued January 21, 2005. A proposed draft EPS Rule was issued on April 22, 2005. Discussions and Commission review of the proposed draft rule and EPS programs continued throughout 2005 and early 2006. The final Renewable Energy Standard and Tariff Rule was approved in November 2006.

Renewable Generating Capacity

This report covers TEP's progress for January 1, 2006 through December 31, 2006, and includes cumulative reporting from January 1, 1997. As of December 31, 2006, TEP had installed or supported installation of a total of **11,380 kW** of renewable generating capacity, which has generated **283,381,132 kWh** of renewable energy and accumulated **160,725,277 kWh** of renewable credits using the appropriate multiplying factors in the EPS since January 1, 1997. The total renewable credits amount to **444,106,410 kWh**. Later tables will summarize capacity, program costs and requirements of the EPS.

EPS Program Results Summary

Since 1999, TEP has spent $33,928,830 on renewable energy development programs in support of developing renewable generation resources to meet the annual energy percentage goals of the EPS. In return, TEP has received revenues of $30,373,371 for these programs. Thus, TEP has spent $3,555,459 more than revenues received in our best effort to meet the annual solar energy percentage goals of the EPS. EPS surcharge collections effectively began in March 2001, and the annual retail energy reported for EPS purposes has been prorated to a 10-month year in 2001 for the purpose of this report.

TEP has successfully met the EPS requirement for "Other" credits every year of the EPS and carried a surplus of 115,148,496 kWh of "Other" credits into 2007. However, TEP was only able to meet **37.95%** of its "Solar Electric" goals for 2006 and **43.95%** of its "Solar Electric" credit goals for the 70-month period ending December 31, 2006, and carried a deficit of -112,176,584 kWh of solar credits into 2007. Overall, TEP met **62.77%** of its EPS renewable energy goals for 2006, and has met **68.21%** of its total 70-month EPS renewable energy goals thru December 2006.

The implementation of a multi-year, pay-as-you-build funded EPS allows for development of cookie cutter PV system designs in a size optimized to take advantage of partnering opportunities with the manufacturers of the major components of PV systems to optimize Balance of System ("BOS") costs through both material and installation labor cost reductions. TEP has taken advantage of this intended feature of the EPS by using refined design techniques to effect cost reductions in electrical systems, support structures, inverters, site preparation, grid connection and data acquisition systems. The EPS, as adopted by the ACC, allowed TEP to be assured of multi-year funding and has provided TEP with certainty of financing essential to enter into long-term relations with specific makers of the primary components of PV systems – PV modules and inverters – to allow for partnering to optimize the BOS design and installation, resulting in BOS costs of less than $1 per DC watt of installed PV capacity in 2003, only the third year of the EPS. This BOS cost level meets a long-term goal of federal renewable energy programs. This benefit would not have been possible with year-to-year EPS funding.

Technical Requirements

In addition to the relatively high initial cost of solar electric generation, there continue to be some technical issues related to the reliability and annual energy production of smaller solar electric generation systems that are a slight hurdle to widespread commercialization of customer-based solar electric generation products. These issues of high initial cost, reduced reliability, and reduced annual energy performance are addressed in the Solar PV Resource Development section of this report.

SunShare & Net Metering

TEP offers the SunShare hardware buy-down program, with ACC approval, to its customers. Since the program was offered in 2001, 188 customers have purchased our Option 2 package, which is a solar kit offered by TEP at a pass through cost. This accounted for 388 kits delivered for installation, representing **582** kW DC. In addition, 136 customers qualified for, and joined, the SunShare Option 1 or Option 3 program through December 31, 2006, with a total installed DC capacity of 197 kWp for both Option 1 and 3. The net program total is 324 SunShare participants through December 31, 2006. There is currently 883 kW DC of customer sited, installed PV capacity as part of the SunShare or customer partnering programs. TEP requested, and received on February 10, 2004, ACC approval for changes in the SunShare program for 2004 to allow more customers to qualify for the program while retaining high standards for safety, reliability and performance of systems in the SunShare program. The ACC also approved a revision in the Option 3 subsidy payment from $2 per DC watt to $3 per DC watt in August 2004. The $3 per DC Watt was reinstated in the 2007 revised SunShare program approved by the ACC.

In 2001, TEP offered, with Commission approval, a net metering option for owners of photovoltaic ("PV") systems of less than 5 kW AC in size. TEP requested, and the Commission approved in March 2003, an increase in the maximum size of a PV generation system qualifying for net metering to 10 kW AC and expanded the eligible technologies to include wind generation up to that size. As of December 31, 2006, 225 PV customers have qualified and enrolled in the net metering program. No wind customers have yet enrolled in net metering. These PV customers have a combined installed solar generation capacity of about 344 kW DC.

GreenWatts

GreenWatts is an ACC approved TEP green power purchase program that enables interested supporters to pool funds and invest directly in the creation of green power. Each GreenWatt is sold in "blocks" of 20 kWh per month. Revenues from GreenWatts are used for installing more community based solar generation. At the end of December 31, 2006, TEP has commitments from 1,766 residential customers, amounting to adoption of 3,695 blocks and 34 commercial customers who have adopted 705 total blocks of green energy.

Total revenues produced to date are $72,825 from commercial customers and $324,809 from residential customers for total revenue of $397,634. All of these funds have been or soon will be applied to installation costs of additional community based PV systems installed in the Tucson area, such as at the Tohono Chul Museum, the City of Tucson's Hayden Udall Water Treatment Facility, Reid Park Zoo, Hohokum Middle School, Tucson Botanical Gardens, Safford Middle School, Palo Verde High School, TUSD's Project MORE, Davidson Elementary School and Vail School District's Empire High School.

The number of GreenWatts adopters more than tripled after a membership campaign featuring "Sunny" the GreenWatt was rolled out in spring of 2002, combined with bulk mailing to all TEP customers. Another membership campaign in November 2003 increased membership by more than 32%. However, a similar publicity campaign in November 2004 resulted in addition of less than 100 new Greenwatts participants. Total membership after seven years of program offering is just over 0.53% of all TEP customers, as compared to a national average of about 0.75% where green power purchase options have been offered for nine years or more. The program has experienced a higher rate of customers leaving the program in 2005 than in prior years. A membership campaign using bill stuffers was used in 2006 after a moderately successful targeted newsletter and radio campaign in late 2005. The increase in GreenWatts customers from 2005 to 2006 was about 14.6%.

Solar Generation Educational Outreach Efforts

The year 2006 saw TEP involved in a range of public events focusing on GreenWatts and SunShare and providing general outreach about solar and renewable energy. TEP maintained a presence at community events designed to address potential audiences for the Company's solar and renewable programs. Activities such as the annual Earth Day Celebration and the Sustainable Building and Solar Tour, provided opportunities to disseminate information and answer questions about TEP programs, and to see PV facilities "in action." Sunny, TEP's GreenWatts' mascot, remained active calling attention to clean, green renewable energy for children and families and encouraging energy conservation.

As the "spokesperson" or cheerleader for Energy Efficiency and Renewable Energy, Sunny the GreenWatt introduces educational programs on the TEP website, appears in ads in Bear Essential News (a statewide school-focused news magazine for children and teachers) and attends community events "in person" spreading a positive energy and environmental message.

Again in 2006, TEP co-sponsored and participated in a week-long Solar Electric Institute (SEI) installation training offering partial registration scholarships to potential SunShare participants, many of whom are able to afford photovoltaic solar energy by installing the system themselves. In addition, TEP personnel provided trainings and informational presentations at the Tucson Botanical Gardens, through the Arizona-Sonora Desert Museum education department and elsewhere in the community such as homeowner association meetings, civic organizations and breakfast clubs.

As in the past, the dedication of facilities for TEP's Community Solar Program recipients provided opportunities for public education. The installation of 9.6 kilowatts of PV at the newly constructed Davidson Elementary School was celebrated at a dedication early in the year. The more recent opening of the long-awaited and heavily traveled Alvernon Bridge over the Rillito River has made Davidson School, partially funded by GreenWatts donations, the most visible of all TEP's community photovoltaic installations.

Other visible community solar projects include the City of Tucson's Clements Recreation Center on the east side of town and the Tucson Botanical Gardens midtown. Tucson's first solar powered parking garage, the Pennington St. Garage, continues to draw attention, and has even been the site of several parties and receptions by local environmental groups, in an effort to showcase the project. The top level of the city garage not only provides great views of the city-scape, but serves as a respectable dance floor as well! Plans are moving ahead for community solar installations at the Tucson International Airport, the University of Arizona Visitors' Center, and schools in the Amphitheatre and Flowing Wells Districts as well as for the Jewish Federation and the Tucson Zoological Gardens, all visible locations that provide excellent educational opportunities. TEP continues to support the Arizona Solar Center, a renewable energy web site dedicated to providing renewable energy information specific to Arizona. Three more solar-lighted sculptures have been installed in the heavily trafficked plaza in front of Symphony Hall at the Tucson Convention Center as a part of the Luminarias del Pueblo; a project presented by the Tucson Pima Arts Council and designed to illustrate the value, flexibility and durability of solar energy to a completely different audience.

The Educational Programs web page at www.tep.com expanded its offerings significantly during 2006, and exponentially with the creation of the Arizona Utility Renewable Energy Education (AZURE) project, an effort by the state's major utilities to share and thereby enhance information about the state's renewable resources. Classroom presentations are available as a companion to the new Tucson Solar Schools web project, but the largest audiences in 2006 resulted from presentations at the Southern Arizona Regional Science and Engineering Fair (SARSEF) and the accompanying Raytheon Science and Math FunFest. More than 6,000 4th - 6th grade students attended the three day FunFest, offering hands-on activities that ranged from touching a "live" heart from the UA Medical College or donning an astronaut's gear to creating energy on a bicycle, the latter activity being TEP's educational offering for student participation.

Early in 2006, the new Electri-City Energy Efficiency Exhibit at the Tucson Children's Museum provided a new experience for young children. And interest remains high in local classrooms for the "real time" solar tracker at GreenWatts.com. The Solar tracker, which is updated every two minutes, shows actual energy output from the Springerville Generating Station Solar Array, and has been a consistent draw to TEP's website.

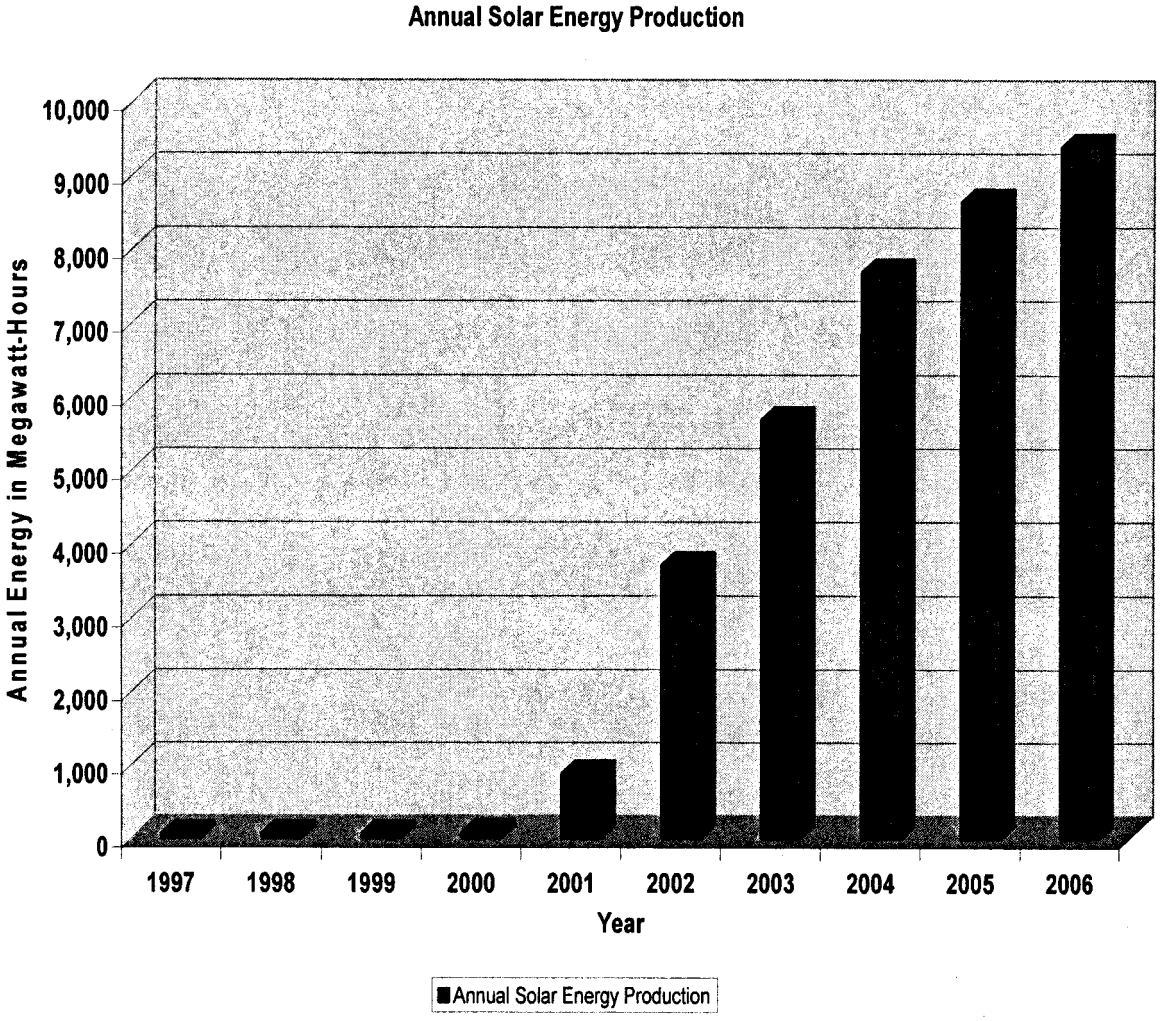
In 2006, members of the TEP solar group made numerous presentations to civic, educational and neighborhood groups ranging from 15 - 250 people on topics that focused on TEP's solar and renewable programs. These appearances included high-level presentations by Tom Hansen, Vice President of Environmental Services, Conservation and Renewable Energy, who spoke to groups ranging from the 150 - member Tucson Rotary Club to the Distributed Energy Association of Arizona Symposium in Sedona, Arizona in addition to renewable energy presentations at the Arizona State Legislature and the Arizona Corporation Commission. Others on the TEP team spoke at numerous community gatherings, providing more general presentations about solar and renewable energy and to quasi-governmental gatherings such as the Environmental Planning Advisory Committee (EPAC) of the Pima Association of Governments as well.

TEP has also been working with the City of Tucson in developing PV Model Plans to help streamline the development review and permitting process for local PV installers. These model plans were completed in 2006; however, the goal of enabling local installers to perform an expedited walk-through process for new customer installations is yet to be achieved.

Renewable Energy Resources and Renewable Resource Survey Systems

TEP continues to operate a system of 15 renewable resource survey systems. This includes eight 40-meter high fixed wind survey towers at locations in Arizona. This data is provided to Northern Arizona University for public domain application. TEP continues to evaluate a wide range of renewable energy options for the future, including landfill gas, biomass, wind, digester gas and solar thermal electric conversion.

TEP installed 410 kWp DC of solar PV electric generation in 2006, including the addition of a 3.0 kW DC solar electric system at Operating Headquarters in Tucson and 407 kWp DC rating of SunShare systems. TEP's annual solar energy electricity production has increased with each year of the EPS program per the graph below. In 2006, 0.102% of annual retail electricity was produced by solar PV generation.



Past Environmental Resource Development Goals

TEP reached its goal of having 5 MW of renewable generating capacity by the end of the year 2000, which was derived from the ACC's 1992 Integrated Resource Planning Procedures.

Summary of EPS Requirements

Description	Cumulative Thru 12/31/05	Reporting Period Jan-Dec 06	Cumulative Thru 12/31/06
Retail Sales, kWh	40,579,580,641	9,201,419,165	49,780,999,806
TEP EPS Requirement (1.05% of retail sales for 2006), kWh	256,179,878	96,614,901	352,794,779
"Other" Credits Needed To Meet EPS Requirements(40% in 2006)	114,112,653	38,645,960	152,758,614
"Solar Electric" Resource Credits Needed to Meet EPS Requirements.	142,067,225	57,968,941	200,036,166
Landfill Gas Project "Other" Credits	334,705,993	23,839,103	358,545,096
"Solar Electric" Resource Credits	64,223,667	21,339,408	85,563,076
Wind Credits Purchased	17,781	3,354	21,135
Wind Generated Credits	0	430	430
"Other" Credits Purchased	0	0	0
"Solar Electric Manufacturing" Credits Obtained from Global Solar, kWh	1,668,771	663,171	2,331,942
Sales of "Other" Credits, kWh	-82,716,871	-7,942,680	-90,659,551
Purchases of "Solar Electric" Credits	21,065	0	21,065
Total "Solar Electric" Credits	65,913,503	22,002,579	87,916,083
Total "Other " Credits	252,006,903	15,900,207	267,907,110
Excess "Solar Electric" Credits Above Meeting EPS Requirements, kWh	-76,211,219	-35,966,361	-112,177,580
Excess "Other" Credits Above Meeting EPS Requirements, KWH	137,894,250	-22,745,754	115,148,496

Summary Of Renewable Generation And Capacity

Type of Generation	kW Capacity	Cumulative Generation, kWh	Cumulative Extra Credits, kWh	Cumulative Renewable Credits, kWh
Landfill Gas	5,500	246,660,504	111,884,592	358,545,096
Solar PV	5,880	36,720,199	48,840,470	85,560,669
Solar Trough	0	0	0	0
Small Hydro-Electric	0	0	0	0
Wind Generation	2	430	215	645
Total Other	5,502	246,660,934	111,884,807	111,884,807
Total Solar Electric	5,880	36,720,199	48,840,470	85,560,669
Total Solar Electric and Other	11,382	283,381,132	160,725,277	444,106,410

Summary of Program Expenditures

Program	Thru 12/31/05	Program Costs Period Jan-Dec 06	Life of Program Thru Dec 06
Solar Electric ***	$32,325,028	$1,442,024	$33,767,052
Solar Thermal	$0	$0	$0
Geothermal	$0	$0	$0
Wind **	$152,519	$9,259	$161,778
Hydro	$0	$0	$0
Other Technologies	$0	$0	$0
Marketing **	$267,810	$23,318	$291,128
Hardware Buydown Program - Option 1,3 **	$421,699	$122,226	$543,925
SunShare Option 2 Revenue **	$541,139	$1,824,894	$2,366,033
SunShare Materials Cost **	$1,509,622	$2,259,930	$3,769,553
Total TEP Renewables Program ***	$32,477,547	$1,442,024	$33,928,830

** These expenditures included in Solar Electric expenditure data.
*** No major expenditures in 2006 plus adjustments were made to SunShare cost calculations for 2006.

Summary of Program Revenues

Description	Period Thru 12/31/05	Period 1/1/06 Thru 12/31/06	Life of Project	2006 Retail Energy Sales MWH
GreenWatts Total	$312,150	$85,485	$397,635	-
Allocation of SBC Total	$12,660,000	$2,460,000	$15,120,000	-
Residential Surcharge Total	$6,033,587	$1,338,644	$7,372,231	3,778,369
Small Commercial Surcharge Total	$6,002,925	$1,321,137	$7,324,062	3,556,462
Large Commercial Surcharge Total	$135,757	$23,686	$159,443	1,886,588
Renewables Surcharge Total	$12,172,269	$2,683,467	$14,855,736	9,201,419
Total EPS Program Revenues	$25,144,419	$5,228,952	$30,373,371	-

Installation Progress 2006

Project	Install Date	kWp DC Capacity	kWh Output Thru 12/31/06	Initial Costs	Total Operating Cost Thru 12/31/06	$/kWh for Project
Community Projects						
Reid Park Zoo ASE/TR 840w Xtal	Mar-00	0.84	3,713	$7,400	$6,669	N/A
Pima Air Museum ASE/TR 1200w Xtal	Jun-00	1.2	9,624	$7,099	$400	$0.0687
UofA Agriculture Station	Jan-02	5.62	49,131	$120,000	$529	$0.2007
Hayden/Udall # 1 ASE/TR 21.6 KW ***	2002	21.6	155,514	$142,975	$898	$0.0664
Hayden/Udall # 2 ASE/TR 21.6 KW ***	2002	21.6	153,602	$142,050	$841	$0.0678
3131 S. Naco Vista	Apr-99	0.75	9,835	$6,944	$400	$0.0704
Tohono Chul BPSX140U/SB - 2800w	Dec-02	2.8	19,456	$23,286	$400	$0.0807
Civano Vail School MST50/TR 3000w 1	2004	3	10,670	$15,990	$600	$0.0657
Hohokam TUSD BP3160Q/FR 4480w	2004	4.48	12,319	$21,584	$650	$0.1018
Ft Huachucha Solar ASE/OMN 30 KW	1997	30	292,936	$180,000	$3,650	$0.0694
Tucson Audubon Society	2005	1.5	3,380	$8,412	$100	$0.0815
Tucson Botanical Gardens	2005	3	8,100	$16,576	$500	$0.0673
Clements Center - City of Tucson	2005	6	13,139	$28,928	$100	$0.0606
Project MORE - TUSD	2005	15	46,751	$55,214	$100	$0.0333
Pennington St. Garage - City of Tucson	2005	60	145,034	$420,000	$0	$0.0611
Vail Empire High School	2005	7.5	12,920	$38,860	$0	$0.0592
SunShare						
Sun Share Installed 1999 **	1999	6.2	61,225	$50,000	$300	$0.1135
Sun Share Installed 2000 **	2000	4.8	19,023	$25,000	$300	$0.1092
Sun Share Installed 2001 **	2001	7.2	62,597	$79,110	$3,650	$0.1150
Sun Share Installed 2002 **	2002	54.25	310,627	$294,332	$12,010	$0.0723
Sun Share Installed 2003 **	2003	63.5	308,391	$340,460	$12,105	$0.0668
Sun Share Installed 2004 **	2004	104.8	434,939	$849,611	$21,550	$0.0935
Sun Share Installed 2005 **	2005	131.9	358,571	$725,755	$13,810	$0.0580
Sun Share Installed 2006 **	2006	407.0	313,653	$1,724,235	$11,350	$0.0922

Project	Install Date	kWp DC Capacity	kWh Output Thru 12/31/06	Initial Costs	Total Operating Cost Thru 12/31/06	$/kWh for Project
Utility (TEP)						
SGS-125C-1 ASE/XN 135 KW Xtal	Jul-01	135	1,186,126	$1,125,637	$6,472	$0.0826
SGS-125C-2 ASE/XN 135 KW Xtal	Jul-01	135	1,232,107	$848,927	$5,748	$0.0610
SGS-125C-3 ASE/XN 135 KW Xtal	Aug-01	135	1,183,389	$779,470	$5,837	$0.0564
SGS-125C-4 ASE/XN 135 KW Xtal	Aug-01	135	1,172,795	$885,503	$5,629	$0.0642
SGS-125C-5 ASE/XN 135 KW Xtal	Nov-01	135	1,142,286	$891,576	$5,494	$0.0651
SGS-125C-6 ASE/XN 135 KW Xtal	Nov-01	135	1,161,839	$830,314	$5,459	$0.0595
SGS-125C-7 ASE/XN 135 KW Xtal	Oct-02	135	1,008,953	$896,984	$5,071	$0.0640
SGS-125C-8 ASE/XN 135 KW Xtal	Oct-02	135	1,024,791	$896,332	$5,343	$0.0639
SGS-125C-9 ASE/XN 135 KW Xtal	Oct-02	135	1,008,890	$900,199	$6,526	$0.0649
SGS-125C-10 ASE/XN 135 KW Xtal	Oct-02	135	1,021,449	$910,976	$6,301	$0.0631
SGS-125C-11 ASE/XN 135 KW Xtal	Jun-02	135	1,069,962	$899,885	$6,526	$0.0632
SGS-125C-12 ASE/XN 135 KW Xtal	Jun-02	135	1,001,674	$901,081	$6,526	$0.0654
SGS-125C-13 ASE/XN 135 KW Xtal	Jun-03	135	801,865	$866,453	$4,116	$0.0646
SGS-125C-14 ASE/XN 135 KW Xtal	Jun-03	135	805,570	$866,190	$4,016	$0.0625
SGS-125C-15 ASE/XN 135 KW Xtal	Aug-03	135	792,234	$867,159	$4,016	$0.0622
SGS-125C-16 ASE/XN 135 KW Xtal	Aug-03	135	802,792	$860,732	$4,091	$0.0610
SGS-125C-23 ASE/XN 135 KW Xtal	Jul-04	135	559,985	$813,735	$1,732	$0.0580
SGS-125C-24 ASE/XN 135 KW Xtal	Jul-04	135	555,836	$799,027	$1,582	$0.0571
SGS-125C-25 ASE/XN 135 KW Xtal	Jun-04	135	576,121	$843,527	$1,740	$0.0599
SGS-125C-26 ASE/XN 135 KW Xtal	Jun-04	135	589,067	$840,998	$1,740	$0.0596
SGS-125C-27 ASE/XN 135 KW Xtal	Jun-04	135	588,325	$762,344	$1,740	$0.0541
SGS-125C-28 ASE/XN 135 KW Xtal	Jun-04	135	571,518	$835,890	$1,740	$0.0604
SGS-125C-29 ASE/XN 135 KW Xtal	Nov-03	135	730,641	$849,606	$1,740	$0.0611
SGS-125C-30 ASE/XN 135 KW Xtal	Nov-03	135	731,631	$724,018	$1,740	$0.0518
SGS-125C-31 ASE/XN 135 KW Xtal	Aug-03	135	784,969	$856,574	$4,016	$0.0613
SGS-125C-32 ASE/XN 135 KW Xtal	Aug-03	135	770,250	$856,552	$4,016	$0.0618
SGS-125TF-1 FS/XN 134.4 KW Cd-Tl	Sep-01	135	1,173,136	$737,815	$17,923	$0.0554
SGS-125TF-2 FS/XN 134.4 KW Cd-Tl	Sep-01	135	1,092,953	$620,396	$16,657	$0.0472
SGS-125TF-3 FS/XN 134.4 KW Cd-Tl	Jun-03	135	798,264	$759,114	$2,926	$0.0576
SGS-125TF-4 FS/XN 134.4 KW Cd-Tl	Jun-03	135	828,001	$759,122	$2,926	$0.0548
SGS-125TF-5 BP/XN 129 KW a-si	Oct-01	135	1,054,832	$760,802	$2,828	$0.0654
SGS-125TF-6 BP/XN 129 KW a-si	Oct-01	135	1,105,538	$760,717	$2,828	$0.0633
SGS-125TF-7 BP/XN 129 KW a-si	Oct-01	135	1,067,900	$736,514	$2,828	$0.0620
SGS-125TF-8 BP/XN 129 KW a-si	Oct-01	135	1,069,758	$741,162	$2,828	$0.0626
SGS-GT3-GS	Jun-05	2.5	4,987	$30,732	$0	$0.1497
OH ASE/SB - 1200w Xtal	Jul-01	1.2	8,405	$8,563	$200	$0.0796
OH ASE/TR - 1200w Xtal	Aug-01	1.2	11,492	$8,369	$200	$0.0584
OH BPMST-50/TR - 1500w a-si	Sep-01	1.5	9,927	$6,666	$1,040	$0.0688
Solar Trailers ASE/TR 5000w Xtal	Jun-05	5	42,809	$70,000	$590	$0.2361
OH BPMST43/Solectria - 2580w a-si	Mar-00	2.5	24,137	$10,250	$558	$0.0443
OH3 20KW ASE/TR 21.6 KW Xtal	Sep-00	20	189,684	$146,342	$1,152	$0.0836

Project	Install Date	kWp DC Capacity	kWh Output Thru 12/31/06	Initial Costs	Total Operating Cost Thru 12/31/06	$/kWh for Project
OH4 20KW ASE/TR 21.6 KW Xtal	Oct-00	20	216,541	$110,534	$576	$0.0589
OH 5KW BP/MST50/Beacon a-si	Feb-04	7.5	11,742	$29,574	$750	N/A
St Johns Test	Sep-00	0	3,512	$11,517	$0	N/A
SGS 20 KW ASE/TR 21.6 KW Xtal	Oct-00	21.6	183,118	$135,060	$3,794	$0.0886
DMP 1 ASE/OMN 108 KW Xtal	Dec-00	108	1,014,987	$589,020	$2,802	$0.0613
DMP 2 ASE/OMN 108 KW Xtal	Dec-00	108	995,994	$527,199	$1,220	$0.0549
Test Trees	Jun-01	0	8,214	$1,500	$0	N/A
OH Global Solar Test/TR - 1440w CIGS	2002	1.4	7,502	$13,447	$631	$0.1387
OH Global Solar Slimline/TR 1656w	2004	1.66	3,959	$18,720	$200	$0.2015
OH BP SX140U/TR-1400w Xtal	2002	1.4	8,672	$8,237	$200	$0.0686
OH Sharp 165/SB - 1320w Xtal	Mar-03	2.64	8,072	$15,699	$1,606	$0.0652
OH Kyocera 158/TR - 1422w Xtal	Apr-03	1.422	7,464	$8,236	$200	$0.0711
OH Sanyo 167HIT/SB - 1336w Xtal/a-si	May-03	1.336	7,627	$8,962	$794	$0.0808
OH Unisolar 64/Trace - 1536w Xtal/a-si	Jun-03	1.536	9,482	$10,228	$200	$0.0642
OH BP SX150U/TR-1500w Xtal	May-03	1.5	7,821	$8,714	$200	$0.0685
OH Sanyo 180HIT/SB - 1440w Xtal/a-si	Jul-03	1.44	8,451	$8,955	$200	$0.0653
OH Shell 40/Tr-1440w a-si	Sep-03	1.44	7,930	$9,244	$497	$0.0769
OH Shell 150/Sharp-3000w Xtal	Sep-03	3	12,741	$16,991	$200	$0.0791
OH Shell 150/TR - 1500w Xtal	Feb-04	1.5	5,381	$8,414	$200	$0.1328
OH AstroPower/TR - 1500w Xtal	May-04	1.485	6,410	$8,532	$200	$0.0626
OH Xantrex GT3.0/BP4170 - 3000w	Sep-06	3	6,642	$12,500	$100	$0.0389
TOTALS		5,880	$36,714,726	$35,460,617	$273,302	$0.0634

** Includes customer expenses for these systems
*** Estimated after grant removal.

SOLAR THERMAL ELECTRIC GENERATION

PROGRAM DESCRIPTION

The purpose of the Solar Thermal Electric Generation Development Program is for technology review and economic assessment of the use of large scale solar thermal electric generators both in combination with existing thermal generating stations and in stand alone generating station applications. This includes solar resource assessment at a couple of possible solar trough sites in Arizona.

TEP reviewed the addition of Thermal Solar Trough produced heat to the condensate cycle of Springerville Generating Station Unit #1 and Unit #2.

In addition, during 2002, TEP received and evaluated a proposal for installation of a solar dish generation system and an opportunity to install a stand alone solar trough generation system.

There has been no significant testing activity in this area in 2004, 2005 or 2006, but interest from private developers for a large solar thermal generation project in Arizona or a neighboring state has been increasing based on a number of contacts with potential developers. This has resulted in a consortium of western utilities evaluating the potential of a large concentrating solar power (CSP) system to be built in the southwestern US. TEP has concerns over the large amount of water per kWh of production consumed by certain types of CSP technologies and the incremental fuel costs associated with capacity firming, both effects due to the low thermal efficiencies of those technologies.

PROGRAM CHANGES FOR 2007

TEP will continue to actively participate as part of the western utility CSP consortium. Resource and system economics evaluation will continue.

LANDFILL GAS AND BIOMASS / BIOGAS PROJECT

PROGRAM DESCRIPTION

The purpose of the Landfill Gas and Biomass Project program is to develop existing landfill gas and biomass / biogas resources into reliable, cost effective environmentally sensitive electric generation fuel sources. The program's purpose is also to find and economically use existing biomass / biogas resources to produce electric energy.

PROGRESS AND PARTICIPATION

In August 1999, TEP and the city of Tucson started electric production from the installation of a nominal 5 MW Landfill Gas System at the Los Reales Landfill in Tucson, Arizona. The landfill gas is piped from the landfill to the Irvington Unit 4 Generating Station where it is co-burned with coal and/or natural gas. During the very dry year of 2003, the average energy produced from landfill gas was 3,741 kW, in 2004 the average energy production from landfill gas was 3,679 kW, in 2005 the average energy production from landfill gas was 3,615 kW and in 2006 the average production from landfill gas was 3,067 kW. However, based on previous generating performance exceeding a monthly average of 6,000 kW during periods of normal atmospheric moisture, and an expectation that repairs and improvements to the landfill gas collection system will be made by the landfill gas vendor in 2007, TEP is claiming 5,000 kW of landfill gas capacity in the Executive Summary.

To date (1999 through December 31, 2006) the project has displaced the use or production of the following:

Tons of Coal Not Burned	113,143
Tons of CO2 Not Produced	165,943
Tons of SO2 Not Produced	996

There were no costs beyond those expected of normal fueled generation from the operation of the landfill gas to energy system in 1999, 2000, 2001, 2002, 2003, 2004, 2005 or 2006. Thus, there are no expenses against the EPS surcharge or other sources of renewable generation revenue. EPS credits produced have been reported by TEP to meet EPS annual credit requirements, sold to other utilities providing additional revenue for solar generation development or banked for the future. The current status of EPS landfill gas generation production credits are reported in the EPS Programs Executive Summary.

In 2006 alone, landfill gas production displaced the use of 10,814 tons of coal, 15,861 tons of CO2 and 95 tons of SO2.

2006 Landfill Gas Generation Summary

	January	February	March	April	May	June	July	August	September	October	November	December	Year to D
Landfill Gas Burned-Mscf From Operating Summary	58	55	33	11	40	47	50	50	44	48	3	39	478
Landfill Gas Ave Btu/scf From Operating Summary	484	479	486	536	520	499	486	490	490	479	481	472	492
Landfill Gas Heat Input-MMBtu Calculated From Op Summary	28,072	26,345	16,038	5,896	20,800	23,463	24,300	24,500	21,560	22,992	1,539	18,408	233,903
Unit 4 Net Heat Rate From Operating Summary	10,586	10,503	10,764	11,031	9,193	10,419	9,871	10,781	10,946	10,697	9,651	11,231	10,473
MMBtu of Landfill Gas From Invoice	28,087	26,318	16,049	5,894	20,806	23,820	24,611	24,642	21,939	23,103	1529	18696	235,394.00
Landfill Gas Generation in kWh Calculated From Data Above	2,653,221	2,505,760	1,490,988	534,312	2,263,244	2,286,208	2,483,132	2,285,688	2,004,294	2,159,764	158,429	1,664,678	22,489,720
Monthly U4 Service Hours From Operating Summary	718.77	667.50	405.97	275.74	633.45	712.43	744.00	740.53	664.58	705.33	330.75	732.82	7,332
Average Landfill Generation Capacity in kW - Calculated	3,691	3,754	3,673	1,938	3,573	3,209	3,338	3,087	3,016	3,062	479	2,272	3,067
Cumulative 2006 Landfill Gas Generation in kWh - Calculated	2,653,221	5,158,981	6,649,970	7,184,282	9,447,526	11,733,734	14,216,866	16,502,554	18,506,848	20,666,612	20,825,042	22,489,720	22,489,720
Unit #4 Coal Heat Value HHV in Btu/lb - Operating Summary	10,683	11,216	11,216	11,015	10,493	11,112	10,452	10,452	11,231	11,163	10,089	11,107	10,852
Coal Displaced by Landfill Gas, in Tons, Calculated	1,314.6	1,173.2	715.6	267.6	991.4	1,071.8	1,172.6	1,178.8	976.7	1,034.8	75.8	841.6	901
2006 Cumulative Coal Displaced By Landfill Gas in Tons	1,314.6	2,487.8	3,203.3	3,470.8	4,462.2	5,534.0	6,706.6	7,885.4	8,862.1	9,896.9	9,972.7	10,814.3	10,814
CO_2 Emissions Deferred by Burning Coal in Tons - 40% Fixed Carbon	1928	1721	1049	392	1454	1572	1720	1729	1433	1518	111	1234	1,322
2006 Cumulative CO_2 Emissions Deferred by Burning Coal - Tons	1928	3649	4698	5090	6545	8117	9836	11565	12998	14515	14627	15861	15,861
SO_2 Emissions Deferred by Burning Coal in Tons - 0.44% Sulfur	12	10	6	2	9	9	10	10	9	9	1	7	8
2006 Cumulative SO_2 Emissions Deferred by Burning Coal - Tons	12	22	28	31	39	49	59	69	78	87	88	95	95
Period Hours Available	744	672	744	720	744	720	744	744	720	744	720	744	8,760
On Line Availability (Service) Hours	718.77	667.5	405.97	275.74	633.45	712.43	744	740.53	664.58	705.33	330.75	732.82	7,332
Percentage on Line	96.61%	99.33%	54.57%	38.30%	85.14%	98.95%	100.00%	99.53%	92.30%	94.80%	45.94%	98.50%	83.70%

CHALLENGES/BARRIERS

The output of the Landfill Gas declined from 46,445,118 kWh in 2001 to 31,661,430 kWh in 2002, to 27,742,486 kWh in 2003, and increased slightly to 30,598,027 kWh in 2004 and declined a bit to 30,000,861 kWh in 2005, then down again in 2006 to 22,489,720 kWh.

1. The gas production rate is strongly related to the moisture in the landfill as well as the moisture introduced through atmospheric purge air - the wetter the season, the greater the gas production. The years 2002 through 2006 have been five of the driest years in recent history. Because of the drought, the gas output of the system was reduced.

2. Some of the gas capture wells and collection piping have been damaged due to bulldozers and other large vehicles running over the wells and collection piping resulting in no or low gas output from those wells. Repairs to some damaged items were made during 2005. Eight new wells that were placed in the existing landfill cells in 2005 and 2006. Additional landfill enhancement opportunities will continue to be reviewed in 2007.

Generation of electricity from forest waste and numerous other biomass / biogas sources is being investigated with a number of interested Arizona based parties. Samples of various biomass sources have been collected and sent to selected companies for experimental gasification. Results of these tests indicate that while the materials tested are capable of being gasified by a small number of different processes, some materials are more prone to plug the new technologies than other materials. While these technical issues are a concern, they also increase the cost of production. Economic considerations are currently the primary impediment to effective use of this resource. Harvesting costs alone for forest waste, if unsubsidized, are about four cents per kWh. Biomass transportation costs can add another two to three cents per kWh, depending on the material and distance of transport. There is a concern that there is not an adequate long-term supply of biomass materials to support significant amounts of biomass generation in Arizona. Discussions with potential biomass providers will continue in 2007.

ANALYSIS AND EVALUATION

Optimization of landfill methane production is ongoing. During one month in 2001, the system produced an average of more than 6.5 MW. However, lower atmospheric moisture and rainfall levels in 2002 through 2006 have reduced the moisture introduced to the landfill from inlet purge air. Consequently, waste decay rates have reduced along with output of landfill gas and methane. As moisture introduced to the landfill through purge air is varied by atmospheric conditions, adjustments in purge air rates and landfill gas removal rates will be made to maintain a constant methane content percentage of about 50%. This adjustment will continue for the life of the landfill gas extraction.

A number of beneficial meetings to discuss landfill gas production issues, both short and long term, were held during 2005 and 2006 with the landfill gas vendor US Energy, the City of Tucson and TEP. Information on long-term needs and opportunities was presented, landfill operational constraints noted and more specific plans for future development of additional landfill gas resources introduced. Dialogue between the three parties will continue in 2007 to address landfill gas capacity enhancement projects to be implemented in the future.

PROGRAM CHANGES FOR 2007

TEP continues to review additional landfill gas to energy projects as well as a number of biomass / biogas waste-to-energy opportunities. An ongoing technology search continues to find efficient technologies to convert a number of Arizona based biomass products into electricity in a safe, reliable, cost-effective manner. The search will continue to locate technically feasible, economically advantageous and environmentally appropriate methods for converting forest waste, biogas and agricultural by-products into electricity.

WIND RESOURCE DEVELOPMENT

PROGRAM DESCRIPTION

The purpose of the Wind Resource Development Program is for wind resource information gathering, technology review and economic assessment of the use of wind energy for electric generation both in combination with existing generating stations and in stand alone generating station applications.

Wind monitor stations have been installed by TEP throughout Arizona. As of December 31, 2006, TEP was collecting data from eight, 40 meter survey towers and ground level wind data at an additional five fixed and two mobile monitor installations. While initial plans were to develop sites for an additional six monitor stations, results of the wind data collected from the existing monitor sites has left some doubt about the economic viability of the wind in the vicinity of some of the monitor sites, so the planning for development of additional monitor sites continues to be on hold pending receipt of more wind data from the existing sites and coordination of monitoring activities with Northern Arizona University and interested wind developers. The bulk of the monitoring is being performed in eastern Arizona around SGS and potential transmission corridor opportunities. However, as customers have indicated an interest in development of wind resources in their area, TEP has monitored those showing signs of promise.

TEP participated with APS and SRP in funding, through Northern Arizona University in collaboration with National Renewables Energy Laboratories ("NREL"), the development of a new high-resolution wind model for Arizona. The final wind model was issued for public use in August 2003. The model indicates that wind capacity in the state of Arizona is likely to be viable in a few selected areas in the eastern and northern part of the state and on ridges and mountaintops, generally a great distance from Arizona's primary population centers. TEP provided NREL with wind data from all but one of its monitoring stations to use in verifying the wind model prior to public issue. The past 31 months of wind resource monitoring activities in one of the areas predicted by the model to be a Class 5 wind regime have indicated the wind resource is likely closer to a Class 3 regime. However, the data taken to date indicates the site is better than any other TEP has monitored in Arizona. In general, Arizona's potential wind resource is not as plentiful or as geographically widespread as the Arizona solar resource. The wind in northern Arizona does have a positive correlation with the loads in Arizona population centers in that the wind tends to blow in Northern Arizona when the sun is shining in central and southern Arizona. That correlation of wind and electrical load does not exist for the site monitored in southern Arizona. Per the final wind model, the potential magnitude of the Arizona wind resource is significant at nearly 25,000 MW of Class 3 and above wind capacity. Harvest of the Arizona wind resource must be given serious technical, economic and policy review. The next step in this review is to gather additional information for the installation of a planned grid of wind monitor towers. Development of additional transmission resources to move the wind energy to the population centers is a high priority once the locations of the economically viable wind resources are accurately determined. To serve this end, starting in mid-2005, TEP shared its wind resource data with Northern Arizona University to be put into the public domain. This

data will provide potential wind developers with additional information to allow more intelligent siting of new wind monitor towers in Arizona by using the existing data as a baseline.

PROGRESS AND PARTICIPATION

In 1997, TEP completed its first two-year monitoring period for wind and solar resources at seven locations in Arizona. Since that time an additional twenty two sites have been chosen for monitoring. These sites have not yet included locations such as high ridges and mountain tops upon which the installation of wind turbines could have a scenic impact from the construction of roads to allow access to the ridges and mountaintops and the transmission lines that will need to be added to move the electricity to market and the operation of the wind turbines themselves.

One site a short distance west of Springerville, Arizona, has wind of very marginal economics, about 11% annual capacity factor. One site located northeast of Springerville had wind of even less economic value, as did a site in southern Arizona near Rain Valley. All three monitoring sites located on the property of SGS completed six years of data monitoring at the end of 2006, and monitor of the fourth site was discontinued in 2003 as it did not show promise as a successful wind farm location. Of these sites, the best location has exhibited at best a 20% annual capacity factor, when corrected for elevation and temperature, not normally considered sufficient for development of a commercially viable wind farm. These are sites 0301, 0302 and 0304.

Three other sites completed a two-year monitor period at the end of July 2003, at which time the data was analyzed to determine the economic viability of wind generation at those sites. Data indicates one of those sites with a marginally economic level of wind resource at roughly 20% annual capacity factor, when corrected for elevation and temperature, given the newer models of wind turbines capable of operation at lower wind speeds. Two valley type sites that have been monitored for a year or more do not have an economically viable wind resource as compared to other sites. The monitor towers at both of these sites were relocated to new sites. The second monitor site in southern Arizona has exhibited a poor wind resource and its proximity to a canyon yielded a very shallow wind with little overall energy content during most hours of the year. This tower was relocated in late 2003 to another southern Arizona location, which the new wind model indicated had promise. The three years of data collected in 2004, 2005 and 2006 do show a wind regime of marginally viable economics at this location.

Two survey sites, 0602 and 0603, are located a great distance west of Springerville, Arizona. Wind data from these locations show a site of potential interest for a commercially viable wind farm. Another year of data will be taken to determine optimal locations for up to an additional 12 wind survey sites in Arizona. These towers would be planned for installation in the first half of 2008. TEP will need to plan time for site permits to be issued as these sites are on state land. To date, TEP has spent $152,519 on wind survey tower installation and data analysis.
TEP installed a 1.8 kW beta version Southwest Windpower SkyStream grid connected wind turbine on June 13, 2006. The machine will continue to be monitored in 2007 for possible use in residential distributed generation programs.

CHALLENGES/BARRIERS

It is at times difficult to obtain permits for wind monitor tower erection in a timely manner. There have been times when TEP waited for more than a year for permits for survey tower installations on state land. However, discussions with the State Land Department have resulted in a better understanding of the permit process and procedures have been developed to streamline the process in the future.

Reliability of wind direction instrumentation used to be a problem on towers of heights greater than 20 meters. In addition to more than a dozen wind direction sensor failures in the past, TEP monitor towers have also experienced failure of seven anemometers. The manufacturer addressed these concerns with new sensor models, but two of the failures were with the new model anemometers. TEP now installs two anemometers at the 40 meter level to allow for failure of anemometers and wind direction sensors at all four instrumented elevations. No new sensor failures have been experienced in 2004, 2005 or 2006. However, in 2006, the logger at Site 0602 failed in service in early September due to a lightning strike and the batteries in the logger at Site 0603 failed in July and were replaced in August. Site 0304 experienced intermittent data logging failures. All problems are fully resolved as of March 2007.

Just as there is a need to develop PV equipment that is well suited for operation in the Arizona climate, there is a need to develop wind generation machines that will operate reliably and efficiently in the Arizona climate. The low air density that results from high ambient air temperatures and/or high elevations must be considered in the selection of appropriate wind generators for use in Arizona as must the relatively high wind turbulence encountered at many times of the year. There is some good work being performed in developing low speed wind regime turbines at the national laboratory level. This work should result in commercial wind turbines appropriate for use in Arizona in the 2008 to 2010 timeframe.

The new Arizona wind resource map shows the best wind resources located on mountain ridges and tops. The citizens of Arizona have been protective of the scenic vistas of their mountain ranges. The proposed installation of wind turbines on Arizona mountain ranges may bring conflict with residents during the permitting phase, which TEP experienced in Huachuca City, Arizona. Preliminary data taken from survey sites on the gently sloping plains of eastern Arizona indicate that while wind generation is technically viable in those plain locations, due to lower average wind speed regimes in these locations the cost of electricity will be higher than if the wind generators were located on mountain ridges. The cost of developing these wind resources with needed transmission is still likely to be less than 10 cents per kWh, but more than seven cents per kWh. Preliminary evaluation of the scope of resources required for development of this large wind resource indicates the need for additional transmission capacity between northern Arizona and the population centers of Arizona. At this time, the necessary transmission capacity upgrades have not been quantified since the geographic scope of the best wind regimes has not been determined definitively.

The data that has been gathered over the past ten years indicates that the wind regime at the monitor sites in Arizona is not fully predictable and is highly variable with numerous periods of very high rates of change. Integration into the grid of high amounts of generation from this

variable wind regime will require the use of fueled generation and/or energy storage technology to offset the variations in wind generation to maintain compliance with the NERC CPS-2 grid Average Control Error reliability standard. TEP will continue to study and analyze wind data and wind integration studies of other utilities to determine tools for use in mitigating adverse effects to the stability and reliability of the electrical grid when using large amounts of wind generation in the future. A recent study by Idaho Power has estimated costs of integrating wind power into the Idaho Power grid, will exceed $10 per MWh of wind energy produced. As results of wind and solar integration cost studies are very much utility specific, TEP expects to perform a similar integration costs study after gaining at least one year of experience with integrating wind power into our generation portfolio to serve customers in our service territory.

An informal request for wind turbine pricing in 2003 resulted in budgetary quotes that were 40% higher for the wind turbine machines alone than are reported as installed costs by wind developers for wind turbines installed in other states. In 2004, TEP issued Requests for Proposals ("RFP") for wind power from three wind developers, and at the end of 2004 had received only general proposals from two parties. TEP issued an RFP in early 2005 for the possible purchase of wind energy. Bid evaluation, which included valuation of environmental attributes of energy, found no bids to be economically viable as compared to other generation resources. TEP issued another RFP in early 2006 for the possible purchase of all renewable energy, including wind energy. Bid evaluation of the seven bids received; found no bids to be economically viable as compared to other traditional generation resources. However, the difference in price needed for wind energy to be economically viable was relatively smaller than in previous years and we expect to issue another RFP in mid 2007, with successful results expected.

PROGRAM CHANGES FOR 2007

TEP plans to continue evaluating the data from existing wind survey sites, reviewing geographic information to predict new potential wind resource sites and licensing sites for installation of wind and solar resource monitor instrumentation. This data will be used for evaluation of possible wind generation locations and for evaluation of bids received in response to its renewable energy RFP in 2007 and future years. The data will also be used to find tools and the expected range of costs for mitigating the effect on the reliability and stability of the electrical grid from the intermittency of wind generation. Detailed wind speed data will continue to be provided to Northern Arizona University for placement in the public domain for use by all interested parties in developing Arizona's wind resource with out duplication of survey resources.

SOLAR PV RESOURCE DEVELOPMENT

PROGRAM DESCRIPTION

The TEP Solar PV program is designed to develop large utility scale distributed PV generation systems in addition to providing incentives and support for TEP customers to install PV on their premises in a safe, economical manner, which maximizes electrical production from the sun. The large utility scale installations provide the opportunity to provide cost savings through long-term purchases from specific manufacturers and to reduce the cost of solar components through bulk purchasing for the customer based systems.

The goal of the program is to best meet the annual solar electric generation energy requirements of the EPS within the limited funding provided by the EPS while providing sufficient long-term PV demand to drive down PV component costs during the term of the EPS, and to provide feedback to PV component manufacturers to help them improve the safety, reliability and performance of their products to help move the PV industry to product maturity.

PROGRESS AND PARTICIPATION

Large Utility Size Distributed Generation

Installation of large utility scale distributed generation PV systems totaling 4,871 kW DC were completed by December 31, 2005, in Tucson and at Springerville. These systems use PV array building blocks of 21.6 kW DC to 135 kW DC in size, and represented 83.6% of the TEP solar generation base at the end of 2006, while producing 87.54% of the solar electricity in 2006. Different PV module technologies have been used, including crystalline silicon, Cad-Tel, Copper Indium Gallium Selenide ("CIGS") and amorphous silicon. Testing of new module technologies is supported by TEP at the utility scale PV system sites. The results of daily energy production performance are shared with interested manufacturers, and used to identify and correct performance related problems. These systems are heavily instrumented and results are reviewed daily to ensure proper operation of the systems. Effective availability of the largest systems was 99.43% in 2002, 99.78% in 2003, 99.72% in 2004, 99.81% in 2005 and 99.75% in 2006, a very high online operational record for any generating system. These have proven to be very cost effective installations using the opportunity provided by the EPS program to eliminate financing charges. Finance charges are a considerable portion of total costs in high capital, low operational cost projects such as PV. Elimination of finance charges to reduce life cycle ownership costs using the "pay-as-you-go" up-front funding concept inherent in the EPS mechanism adopted by the ACC has made a significant reduction in life cycle cost of energy generated with PV. Evaluation of life cycle costs given limited experience with long-term operating costs of large scale PV indicate that large utility scale distributed PV generation systems should produce EPS solar credits at a cost less than produced by small solar generating systems.

In 2003, one partnering manufacturer retested PV modules that had been in service in Tucson for 28 months to test for dirt and time related output degradation. Modules were tested first without cleaning and then after cleaning. Results indicated less than 1% output degradation from dirt on modules that had not been cleaned in two years and overall time related degradation of clean modules much less than that expected.

Module reliability is very good, with replacement of only one ASE module, a number of first generation First Solar modules and 11 BP Solarex modules required at the Springerville Generating Site Solar System ("SGSSS") in 2004 and none of those types of modules in 2005 or 2006. The most unreliable parts of the SGSSS are the data collection system and the step up transformers. However, changes were made in early 2004 to address the sensitivity to static of the data collection system and set point changes were made to limit the power output of the PV systems during sunsplash conditions to reduce the transformer overloading problem on SCL4. These changes resulted in the improvement of reliability in 2005 despite the system being hit in four places by lightning in July 2005. The primary cause of downtime in 2006 was due to high contact resistance in 480 volt outdoor rated fused disconnects after 5 years in the weather. The contacts for all 24 similar disconnects were changed in early 2006, the contact grease removed and the systems performed correctly for the rest of the year. The grease held dirt and was believed to be the root cause of the problems.

Analysis was performed on the performance data of the SGSSS PV systems by installation date and module technology comparing 2001 data with 2006 to determine if there has been module performance degradation. The rate of degradation for all three module technologies was within the temperature variant noise in the data created by the MSX-01 solar sensors. In other words, the modules are more stable than the sensors used to measure the solar input, and the data analyzed indicated the crystalline module performance had improved with time by 0.2%. However, a very small degradation was noted in the thin film module performance.

The units at Springerville experienced several failures of the distribution grid during 2006. Some planned, some not planned. In all cases all inverters met their IEEE-929 island detection requirements, even with 34 inverters in parallel on the line and some inductive pump motor load, and disconnected nearly instantaneously. Power factor and harmonic testing at numerous loads indicated all parameters were within specifications. As additional inverters are added and the installed capacity of PV approaches the installed load of the pumps and other loads on the radial line, it will be instructive to monitor the transient response of line faults as verification of correct IEEE-929 compliance. In prior years, there were numerous events recorded where inverters in Tucson and at Springerville detected a transmission or distribution line disturbance and disconnected the inverter from the grid. In these cases, the reasons recorded for disconnect by the inverters were not always consistent. Four events were recorded in 2004 where a grid disturbance in one area triggered a trip of an inverter in a remote area. For example, the loss of all three Palo Verde generators on June 14, 2005, resulted in nearly all Tucson based PV inverters, and one Springerville inverter tripping off line for the required five minutes before automatically reconnecting. Data and documentation of these events continues. TEP is working with one inverter manufacturer and the Sandia National Energy Lab to find and test solutions to this grid destabilizing effect that occurs because of the implementation of the IEEE-929 standard. New software was installed in the 34 inverters during 2005 to allow for wider IEEE-929

protection set points to prevent nuisance inverter trips during high voltage transmission line faults. It was found that a low voltage set point of 176 volts rather than the standard 183 volts, low frequency set point of 59.0 Hz rather than the standard 59.5 Hz and high frequency set point of 61.0 Hz rather than the standard of 60.5 Hz prevented any inverter trips during three high voltage transmission line faults in November and December 2005. This information was shared with the inverter designer.

2006 Annual Solar Energy Production To Date

Category	Installed Capacity	Annual Energy	Energy %
SunShare Systems	882 kWDCp	1,048 MWh	11.15
TEP Community Customer Sited	81 kWDCp	123 MWh	1.31
TEP Utility Scale	4,916 kWDCp	8,228 MWh	87.54
TEP Solar Energy	5,880 kWDCp	9,400 MWh	100.0

TEP has sufficient numbers of PV systems of various sizes, locations and technology types to begin making comparisons of these factors on the annual energy production performance of PV systems. These comparisons are made by normalizing the annual energy output by the manufacturers rated power of the total power rating of the PV array modules as measured at the Standard Test Conditions ("STC") by a factory test. Some general trends observed based on 2006 specific annual energy production of systems that had a full year of operation:

- Utility scale PV systems have proven to be more productive than smaller PV systems.
- The cool, windy location of the SGSSS has proven more energy productive than Tucson for fixed tilt PV installations.
- Crystalline Silicon modules and some thin film modules have nearly equal specific annual energy production in the fixed tilt PV application at Springerville.
- The specific site characteristics including maximum and minimum temperatures, maximum wind speed and the type of clouds normally experienced will, in a very large, part determine which type of solar generation technology is most appropriate for a given site. While fixed latitude tilt PV is an excellent choice for Springerville, tracking PV is more appropriate for a less windy location like Prescott, Arizona and tracking thermal concentrator solar is more appropriate for the hot desert west of Phoenix, Arizona.

The concept of installing incremental amounts of solar generation at existing coal power plants to take advantage of existing transmission infrastructure and more effectively use the large amounts of property used as guard space around these plants is being developed as experience is gained in the design and operation of the SGSSS.

Results of the specific performance of the different categories of PV systems in 2005 that had a full year of operation:

2003 THRU 2006 ANNUAL SPECIFIC ENERGY OUTPUT IN KWH AC PER KWDCP @ STC

	2003	2004	2005	2006
SunShare Option 2 Average:	1,347	1,316	1,416	1,664
SunShare All Options Average:	1,375	1,286	1,385	1,454
TEP Tucson Sited Small Systems Average:	1,429	1,503	1,298	1,379
TEP "Tucson" Sited Large Systems Average:	1,596	1,585	1,435	1,553
SGSSS Sited a-si Module Type Average:	1,602	1,567	1,510	1,536
SGSSS Sited CdTe Module Type Average:	1,664	1,722	1,668	1,680
SGSSS Sited C-si Module Type Average:	1,743	1,719	1,669	1,729

- SunShare Option 2 systems are all less than 10 kWDCp in size, amorphous and crystalline silicon module technology systems, located on customer sites in Tucson.
- SunShare Option 1 and 3 systems are all less than 10 kWDCp in size of various module technologies (primarily crystalline silicon) located on customer sites in Tucson.
- TEP Tucson Sited Small Utility Systems are all less than 10 kWDCp in size of various module technologies (primarily crystalline silicon) located either on customer sites or TEP's Operating Headquarters solar test facility in southeastern Tucson.
- TEP Tucson Sited Large Utility Systems are all larger than 10 kWDCp in size, all of crystalline silicon module technology, located either on customer sites or TEP's property in Tucson and includes the single 22 kWDCp system at the Auto Shop at SGS and the single 30 kWDCp system at Fort Huachuca.
- SGSSS Sited Systems are the systems at the West Well field area of SGS. These systems are distinguished by differences in the module technology used in the various systems. Note that there were array enhancements made to the CdTe systems during late 2003, 2004, 2005 and during 2006, so the results are not fully comparable to the results of the other SGSSS technologies.

Small Utility Supported Distributed Generation

Installation of small Customer sited distributed generation systems throughout Tucson has been successful in providing energy in support of EPS solar credit goals and in developing public interest in solar energy. To date 81 kW DC of small TEP supported and maintained PV systems have been installed on customer premises. These systems represent 1.38% of the TEP solar generation base as of December 31, 2006, while producing 1.31% of the solar electricity in 2006. These systems do not provide the same economics for production of EPS solar credits as the large scale PV systems, but provide better solar program visibility. Some GreenWatts revenues are used for support of solar installations in the Tucson area, such as at the Tohono Chul Museum, Pima Air Museum, Safford Middle School, Palo Verde High School, Hohokum Middle School, Tucson Botanical Gardens, Civano School, Empire High School, Davidson Elementary, Project MORE and Doolen Middle School among others.

Customer Partnering Distributed Generation

TEP has partnered with customers, notably the City of Tucson, to install medium sized customer owned and sited PV systems totaling 103 kW DC. These systems represent 1.75% of the TEP solar generation base at the end of 2006, while producing 1.98% of the solar electricity in 2005. These systems provide the opportunity for significant leverage of EPS funding and provide EPS solar credits at the lowest life cycle costs. However, there are a limited number of customers with available funding to support these types of projects. Some GreenWatts revenues are used for support of these installations.

SunShare

TEP offers the SunShare hardware buy-down program, with ACC approval, to its customers. Since the program was offered in 2001, there have been more than 1920 expressions of interest. To date, there have been 324 participants installing PV systems. Of these participants, 21have chosen Option 1, 188 have chosen Option 2, and 115 have chosen Option 3. There were 116 customers who installed PV systems in 2006 as part of SunShare, representing 407 kW DC. There is currently 882 kW DC of customer sited, installed PV capacity as part of the SunShare program. These systems represent 15% of the TEP solar generation base at the end of 2006, while producing 11.15% of the solar electricity in 2006.

The SunShare program was developed to support EPS program goals with small customer based distributed generation PV systems through hardware buy down payments to customers installing any qualifying PV system of their choice (Option 1 and Option 3), and offer of a pre-qualified PV system at a significantly discounted price as compared to market rates (Option 2).

TEP requested in 2003, and received on February 10, 2004, ACC approval for changes in the SunShare program offerings for 2004, 2005 and 2006, including the offering of a new Option 3, to allow more customers to qualify for the program while retaining high standards for safety, reliability and performance of systems in the SunShare program. In August 2004, the ACC approved an increase in SunShare Option 3 funding from $2 per DC watt to $3 per DC watt with an annual reduction of $0.30 per DC watt after 2004. For 2007, the ACC approved funding for $3 per watt for residential systems and $2.50 per watt for non-residential systems.

The SunShare program changes thru 2006 include:

1. Added Option 3, which provides for a $3 per DC watt subsidy payment instead of the $2 per AC watt (roughly $1.33 per DC watt) payment of Option 1 or Option 2. Maintenance is not included in this Option, but does include an annual inspection to ensure the equipment is functional and performs as designed. This Option offers more customer choice.

2. Added a factor for off angle or shaded installations, reducing the subsidy payment by the percentage of the amount of expected annual energy output reduction from the off angle or shading condition. A table defining the percent reduction is included in program documents for easy prediction of the reduction percentage. The percentage reduction affects all three options. The system must face from 90 degrees east of north through south to 90 degrees west of north and have an angle of 10 degrees to 60 degrees from horizontal and be fully unshaded from three hours after sunrise to three hours before

sunset to qualify. This should allow more installations to qualify, while retaining an annual energy based subsidy criteria.

3. Added a minimum of module clearance distance qualification to ensure output is not reduced from overheating due to lack of natural convective cooling.

4. Increased the maximum qualifying PV system size from 5 kW AC to 10 kW AC, or what is typically about 15 kWDC. The minimum size remains at 800 watts AC or about 1,200 watts DC. All systems will still be metered, and TEP still supplies the meter and meter socket. This change should allow more systems to qualify and matches the maximum size of a net metered system.

5. Removed the 5 kW systems from Option 2, as that system could never be offered due to lack of a qualifying inverter. Limits Option 2 kits to ten maximum per customer.

6. The program still has an annual cap of 200 kW of qualifying PV installations. The program will be offered in 2004, 2005 and 2006.

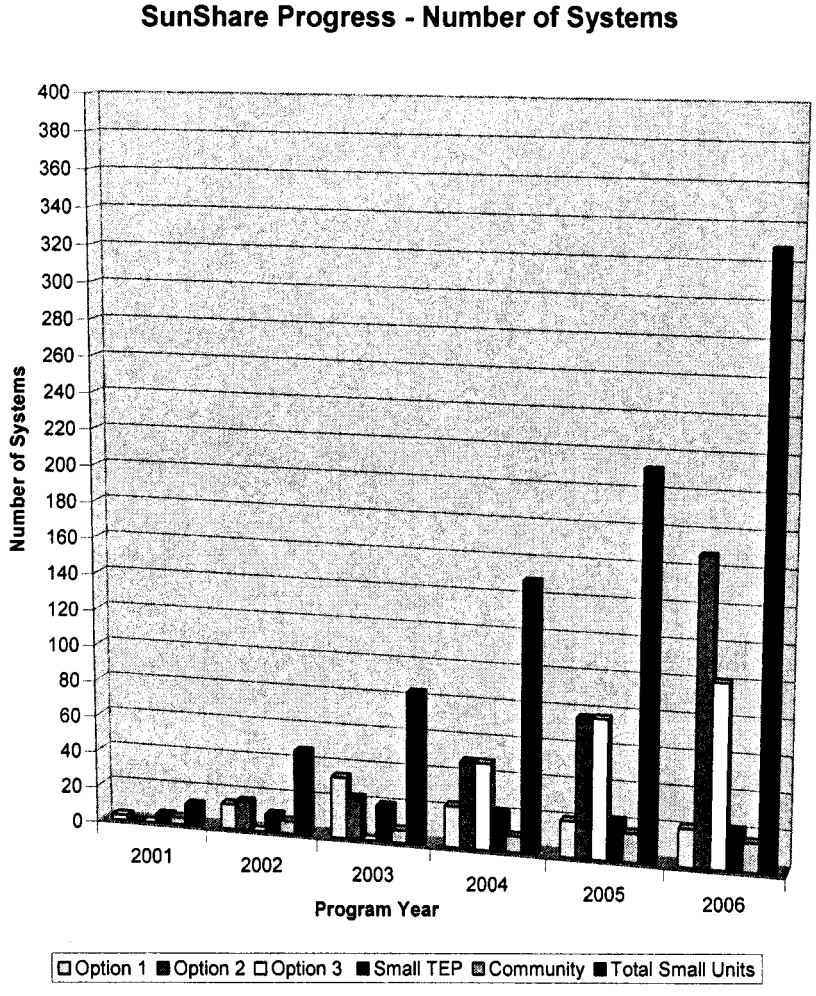
7. The Option 1 rating can now be determined either by test or by comparison to historical data of another "equal" system.

8. Revised the SunShare Annual Report filing date to April 15 to coincide with the DSM/Renewable Report filing date to simplify reporting requirements.

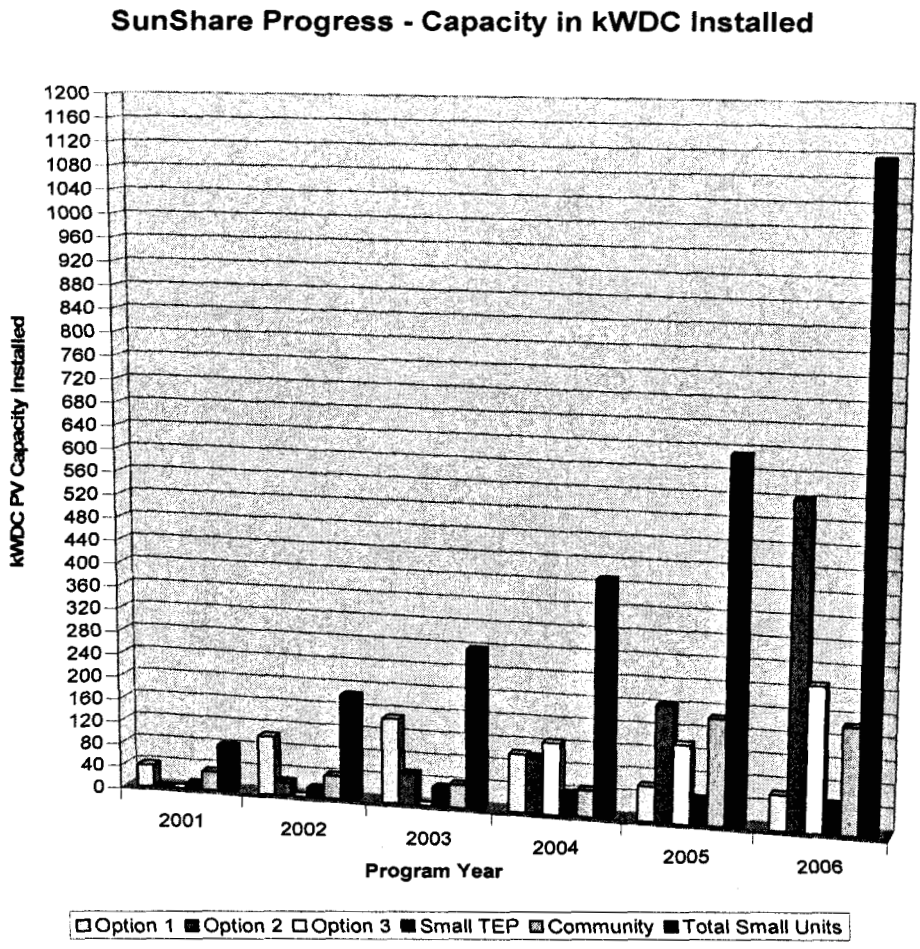
In 2006 additional SunShare revisions were filed and approved by the ACC for 2007. The changes are as follows;

- Extend the term of the Program to December 31, 2008.
- Allow for the elimination of Option Two planned for the end of 2006.
- Provide notice to customers of the opportunity to use Federal income tax credits.
- Ensure that residential systems are not eliminated from the Program reservations by non-residential systems.
- Allow for the assignment of rights to full electrical output and all associated environmental credits to the Company through December 31st of the 20th full calendar year after completion of installation of each solar generation system.
- Add a new program for non-residential photovoltaic systems with a subsidy payment of $2.50 per watt DC up to a maximum subsidy payment for 100,000 watts DC per installation.
- Cap single calendar year subsidy payments to any customer at $500,000 per year.
- Use DC ratings and English units in as many provisions as possible to provide consistency between residential and the new non-residential program offerings.

PROGRESS BY YEAR FOR THE SUNSHARE PROGRAM – NUMBER OF PARTICIPATING CUSTOMERS



PROGRESS BY YEAR FOR THE SUNSHARE PROGRAM – INSTALLED PV CAPACITY



Net Metering

In 2001, TEP offered, with Commission approval, a net metering option for owners of PV systems of less than 5 kW AC in size. TEP requested, and the Commission approved in March 2003, an increase in the maximum size of a PV generation system qualifying for net metering to 10 kW AC and expanded the eligible technologies to include wind generation up to that size. As of December 31, 2006, 225 PV customers have qualified and enrolled in the net metering program, of which 93 customers qualified in 2006 alone. No wind customers have yet enrolled in net metering. These PV customers have a combined installed solar generation capacity of more than 300 kW DC. To further simplify customer sited PV and wind installations, in addition to net metering, TEP also offers simple interconnection requirements for small customer located PV and wind systems.

Solar Water Heating System Evaluation

In late 2004, TEP evaluated various domestic solar hot water systems with regard to economic and penetration feasibility in the Tucson service territory. Since there were hundreds of systems available for consideration, this review focused on a sampling of systems that would be most suited for the Arizona climate. The evaluation was conducted as a preliminary review of systems and programs, targeting the experience of local contractors and other existing utility programs in place. The intent of this review was to assist TEP in determining a course of action for possible implementation of a solar hot water system program for TEP.

TEP reviewed both open loop and closed loop systems, involving older batch, Integrated Collector Storage ("ICS"), recirculating, thermosiphon and other closed loop active systems. From the information available for Arizona systems, open loop recirculating and open loop thermosiphon systems are generally not used or have limited application due to their scaling problems, lack of freeze protection, or low efficiency. Contractors generally prefer ICS and various closed loop systems, active and passive, which have provided the best overall performance in the Arizona climate.

In order to adequately fund a domestic hot water program for TEP, DSM and/or other EPS incentives need to cover all expenses incurred by the utility for program costs. The experience of other programs surveyed indicated many utility programs have operated only partially funded, have been forced to eliminate needed maintenance or inspection tasks, and have generally reduced any efforts that require significant employee time. Other impediments to program success consist of engaging the utility in extensive program management. It is the consensus of many utilities evaluated that a simple rebate program, with discount loans or other incentive provisions, will provide an effective program.

Local solar domestic hot water ("SDHW") system contractors support the idea of TEP providing a targeted program for customers, and TEP will continue to review the feasibility of initiating a program possibly in 2007. TEP performed a survey in early 2006 to access SDHW system performance in our Arizona climate, and will continue to review these results and future surveys in 2007 for potential SDHW program development. This information and continued study of system applications, and O&M and life cycle costs, will need to be considered in the total cost of ownership for the customer when considering a new program for TEP.

Summary of PV Programs

In summary, the TEP Solar PV program, in response to the ACC's EPS annual renewable energy production requirements, has effected the installation or assisted in the development of 5,880 kW DC of solar PV generating resources in Arizona.

Installations, capacity, energy production and costs of these systems are summarized below:

INSTALLATION PROGRESS

Project	Install Date	kWp DC Capacity	kWh Output Thru 12/31/06	Initial Costs	Total Operating Cost Thru 12/31/06	$/kWh for Project
Community Projects						
Reid Park Zoo ASE/TR 840w Xtal	Mar-00	0.84	3,713	$7,400	$6,669	N/A
Pima Air Museum ASE/TR 1200w Xtal	Jun-00	1.2	9,624	$7,099	$400	$0.0687
U of A Agriculture Station	Jan-02	5.62	49,131	$120,000	$529	$0.2007
Hayden/Udall # 1 ASE/TR 21.6 KW ***	2002	21.6	155,514	$142,975	$898	$0.0664
Hayden/Udall # 2 ASE/TR 21.6 KW ***	2002	21.6	153,602	$142,050	$841	$0.0678
3131 S. Naco Vista	Apr-99	0.75	9,835	$6,944	$400	$0.0704
Tohono Chul BPSX140U/SB - 2800w	Dec-02	2.8	19,456	$23,286	$400	$0.0807
Civano Vail School MST50/TR 3000w I	2004	3	10,670	$15,990	$600	$0.0657
Hohokam TUSD BP3160Q/FR 4480w	2004	4.48	12,319	$21,584	$650	$0.1018
Ft Huachucha Solar ASE/OMN 30 KW	1997	30	292,936	$180,000	$3,650	$0.0694
Tucson Audubon Society	2005	1.5	3,380	$8,412	$100	$0.0815
Tucson Botanical Gardens	2005	3	8,100	$16,576	$500	$0.0673
Clements Center - City of Tucson	2005	6	13,139	$28,928	$100	$0.0606
Project MORE - TUSD	2005	15	46,751	$55,214	$100	$0.0333
Pennington St. Garage - City of Tucson	2005	60	145,034	$420,000	$0	$0.0611
Vail Empire High School	2005	7.5	12,920	$38,860	$0	$0.0592
SunShare						
Sun Share Installed 1999 **	1999	6.2	61,225	$50,000	$300	$0.1135
Sun Share Installed 2000 **	2000	4.8	19,023	$25,000	$300	$0.1092
Sun Share Installed 2001 **	2001	7.2	62,597	$79,110	$3,650	$0.1150
Sun Share Installed 2002 **	2002	54.25	310,627	$294,332	$12,010	$0.0723
Sun Share Installed 2003 **	2003	63.5	308,391	$340,460	$12,105	$0.0668
Sun Share Installed 2004 **	2004	104.8	434,939	$849,611	$21,550	$0.0935
Sun Share Installed 2005 **	2005	131.9	358,571	$725,755	$13,810	$0.0580
Sun Share Installed 2006 **	2006	407.0	313,653	$1,724,235	$11,350	$0.0922
Utility (TEP)						
SGS-125C-1 ASE/XN 135 KW Xtal	Jul-01	135	1,186,126	$1,125,637	$6,472	$0.0826
SGS-125C-2 ASE/XN 135 KW Xtal	Jul-01	135	1,232,107	$848,927	$5,748	$0.0610
SGS-125C-3 ASE/XN 135 KW Xtal	Aug-01	135	1,183,389	$779,470	$5,837	$0.0564
SGS-125C-4 ASE/XN 135 KW Xtal	Aug-01	135	1,172,795	$885,503	$5,629	$0.0642
SGS-125C-5 ASE/XN 135 KW Xtal	Nov-01	135	1,142,286	$891,576	$5,494	$0.0651
SGS-125C-6 ASE/XN 135 KW Xtal	Nov-01	135	1,161,839	$830,314	$5,459	$0.0595
SGS-125C-7 ASE/XN 135 KW Xtal	Oct-02	135	1,008,953	$896,984	$5,071	$0.0640
SGS-125C-8 ASE/XN 135 KW Xtal	Oct-02	135	1,024,791	$896,332	$5,343	$0.0639
SGS-125C-9 ASE/XN 135 KW Xtal	Oct-02	135	1,008,890	$900,199	$6,526	$0.0649
SGS-125C-10 ASE/XN 135 KW Xtal	Oct-02	135	1,021,449	$910,976	$6,301	$0.0631
SGS-125C-11 ASE/XN 135 KW Xtal	Jun-02	135	1,069,962	$899,885	$6,526	$0.0632

Project	Install Date	kWp DC Capacity	kWh Output Thru 12/31/06	Initial Costs	Total Operating Cost Thru 12/31/06	$/kWh for Project
SGS-125C-12 ASE/XN 135 KW Xtal	Jun-02	135	1,001,674	$901,081	$6,526	$0.0654
SGS-125C-13 ASE/XN 135 KW Xtal	Jun-03	135	801,865	$866,453	$4,116	$0.0646
SGS-125C-14 ASE/XN 135 KW Xtal	Jun-03	135	805,570	$866,190	$4,016	$0.0625
SGS-125C-15 ASE/XN 135 KW Xtal	Aug-03	135	792,234	$867,159	$4,016	$0.0622
SGS-125C-16 ASE/XN 135 KW Xtal	Aug-03	135	802,792	$860,732	$4,091	$0.0610
SGS-125C-23 ASE/XN 135 KW Xtal	Jul-04	135	559,985	$813,735	$1,732	$0.0580
SGS-125C-24 ASE/XN 135 KW Xtal	Jul-04	135	555,836	$799,027	$1,582	$0.0571
SGS-125C-25 ASE/XN 135 KW Xtal	Jun-04	135	576,121	$843,527	$1,740	$0.0599
SGS-125C-26 ASE/XN 135 KW Xtal	Jun-04	135	589,067	$840,998	$1,740	$0.0596
SGS-125C-27 ASE/XN 135 KW Xtal	Jun-04	135	588,325	$762,344	$1,740	$0.0541
SGS-125C-28 ASE/XN 135 KW Xtal	Jun-04	135	571,518	$835,890	$1,740	$0.0604
SGS-125C-29 ASE/XN 135 KW Xtal	Nov-03	135	730,641	$849,606	$1,740	$0.0611
SGS-125C-30 ASE/XN 135 KW Xtal	Nov-03	135	731,631	$724,018	$1,740	$0.0518
SGS-125C-31 ASE/XN 135 KW Xtal	Aug-03	135	784,969	$856,574	$4,016	$0.0613
SGS-125C-32 ASE/XN 135 KW Xtal	Aug-03	135	770,250	$856,552	$4,016	$0.0618
SGS-125TF-1 FS/XN 134.4 KW Cd-Tl	Sep-01	135	1,173,136	$737,815	$17,923	$0.0554
SGS-125TF-2 FS/XN 134.4 KW Cd-Tl	Sep-01	135	1,092,953	$620,396	$16,657	$0.0472
SGS-125TF-3 FS/XN 134.4 KW Cd-Tl	Jun-03	135	798,264	$759,114	$2,926	$0.0576
SGS-125TF-4 FS/XN 134.4 KW Cd-Tl	Jun-03	135	828,001	$759,122	$2,926	$0.0548
SGS-125TF-5 BP/XN 129 KW a-si	Oct-01	135	1,054,832	$760,802	$2,828	$0.0654
SGS-125TF-6 BP/XN 129 KW a-si	Oct-01	135	1,105,538	$760,717	$2,828	$0.0633
SGS-125TF-7 BP/XN 129 KW a-si	Oct-01	135	1,067,900	$736,514	$2,828	$0.0620
SGS-125TF-8 BP/XN 129 KW a-si	Oct-01	135	1,069,758	$741,162	$2,828	$0.0626
SGS-GT3-GS	Jun-05	2.5	4,987	$30,732	$0	$0.1497
OH ASE/SB - 1200w Xtal	Jul-01	1.2	8,405	$8,563	$200	$0.0796
OH ASE/TR - 1200w Xtal	Aug-01	1.2	11,492	$8,369	$200	$0.0584
OH BPMST-50/TR - 1500w a-si	Sep-01	1.5	9,927	$6,666	$1,040	$0.0688
Solar Trailers ASE/TR 5000w Xtal	Jun-05	5	42,809	$70,000	$590	$0.2361
OH BPMST43/Solectria - 2580w a-si	Mar-00	2.5	24,137	$10,250	$558	$0.0443
OH3 20KW ASE/TR 21.6 KW Xtal	Sep-00	20	189,684	$146,342	$1,152	$0.0836
OH4 20KW ASE/TR 21.6 KW Xtal	Oct-00	20	216,541	$110,534	$576	$0.0589
OH 5KW BP/MST50/Beacon a-si	Feb-04	7.5	11,742	$29,574	$750	N/A
St Johns Test	Sep-00	0	3,512	$11,517	$0	N/A
SGS 20 KW ASE/TR 21.6 KW Xtal	Oct-00	21.6	183,118	$135,060	$3,794	$0.0886
DMP 1 ASE/OMN 108 KW Xtal	Dec-00	108	1,014,987	$589,020	$2,802	$0.0613
DMP 2 ASE/OMN 108 KW Xtal	Dec-00	108	995,994	$527,199	$1,220	$0.0549
Test Trees	Jun-01	0	8,214	$1,500	$0	N/A
OH Global Solar Test/TR - 1440w CIGS	2002	1.4	7,502	$13,447	$631	$0.1387
OH Global Solar Slimline/TR 1656w	2004	1.66	3,959	$18,720	$200	$0.2015
OH BP SX140U/TR-1400w Xtal	2002	1.4	8,672	$8,237	$200	$0.0686
OH Sharp 165/SB - 1320w Xtal	Mar-03	2.64	8,072	$15,699	$1,606	$0.0652
OH Kyocera 158/TR - 1422w Xtal	Apr-03	1.422	7,464	$8,236	$200	$0.0711

Project	Install Date	kWp DC Capacity	kWh Output Thru 12/31/06	Initial Costs	Total Operating Cost Thru 12/31/06	$/kWh for Project
OH Sanyo 167HIT/SB - 1336w Xtal/a-si	May-03	1.336	7,627	$8,962	$794	$0.0808
OH Unisolar 64/Trace - 1536w Xtal/a-si	Jun-03	1.536	9,482	$10,228	$200	$0.0642
OH BP SX150U/TR-1500w Xtal	May-03	1.5	7,821	$8,714	$200	$0.0685
OH Sanyo 180HIT/SB - 1440w Xtal/a-si	Jul-03	1.44	8,451	$8,955	$200	$0.0653
OH Shell 40/Tr-1440w a-si	Sep-03	1.44	7,930	$9,244	$497	$0.0769
OH Shell 150/Sharp-3000w Xtal	Sep-03	3	12,741	$16,991	$200	$0.0791
OH Shell 150/TR - 1500w Xtal	Feb-04	1.5	5,381	$8,414	$200	$0.1328
OH AstroPower/TR - 1500w Xtal	May-04	1.485	6,410	$8,532	$200	$0.0626
OH Xantrex GT3.0/BP4170 - 3000w	Sep-06	3	6,642	$12,500	$100	$0.0389
TOTALS		5,880	36,714,726	$35,460,617	$273,302	$0.0634

** Includes customer expenses for these systems
*** Estimated after grant removal.

CHALLENGES/BARRIERS

Initial Cost

The current high cost of PV modules and inverters is the primary barrier to use PV as a widespread generating technology. This high initial cost also raises those operating costs associated with value, such as property taxes and insurance. While PV module costs were very high in 2001 and 2002, due in some part to excessively high subsidies for PV in neighboring states, the costs had been decreasing in late 2002 and continuing into 2003. However, the high demand for PV in Germany and other parts of Europe during 2004 and 2005 resulted in price increases and long delivery times for PV modules. During the latter part of 2006, the PV prices had started to decline but are still not back to the levels of 2003.

Competition in the inverter market is driving improvements in quality, reliability and price, which are reducing the life cycle cost of PV ownership through reduced initial and maintenance costs as well as increased energy output. However, based on information presented at the DOE Inverter Workshop in October 2004, much work remains to produce residential size PV inverters with the same reliability, performance and low cost per watt factors as utility scale PV inverters.

The implementation of a multi-year, pay-as-you build funded EPS allows for the development of cookie cutter PV system designs in a size optimized to take advantage of partnering opportunities with the manufacturers of the major components of PV systems to optimize BOS costs through both material and installation labor cost reductions. TEP has taken advantage of this intended feature of the EPS by using refined design techniques to effect cost reductions in electrical systems, support structures, inverters, site preparation, grid connection and data acquisition systems. The EPS, as adopted by the ACC, allowed TEP to be assured of multi-year funding and has provided TEP with certainty of financing essential to enter into long- term relationships with specific makers of the primary components of PV systems – PV modules and inverters – to allow for partnering to optimize the BOS design and installation, resulting in BOS costs of less than $1 per DC watt of installed PV capacity in 2003, only the third year of the EPS. This BOS cost

level meets a long-term goal of the federal government renewables programs. This benefit would not have been possible with a "year-to-year" type of EPS.

TEP PV program cost and customer PV cost trend data is shown below. These costs assume that no subsidies or grant funds were used to reduce the cost to the customer. In reality, customers did effectively pay less than this as a result of TEP subsidies, federal tax credits, state tax credits and grants from a number of sources.

SMALL PV CUSTOMER INSTALLED COST BEFORE SUBSIDY IN $/KWDCP @ STC

Average SunShare Option 1 & 3 Cost 2001 through 2006:	$7,569
Average SunShare Option 2 Cost 2001 through 2006:	$5,098
Average TEP Small PV System Cost 1999 through 2006:	$6,797

Performance & Reliability

While the TEP fleet of large scale PV systems had a very high percentage of effective availability in 2002 through 2006 (more than 99.75% when only PV related factors are included), there are challenges remaining in maintenance of PV systems, both large and small. There were 50 separate incidents in 2006 requiring some level of human response to restore the large PV systems to full operation. A part of those responses were to resolve data collection issues, not PV related items. These incidents were only identified because of the instrumentation and communications that is economically viable on large scale systems. The software of the data collection system was updated near the end of 2003 to allow a grid power failure to be reset automatically instead of requiring human intervention, which eliminated the need for 12 trips to the station. These upgrades included changes to allow the data collection system to resolve its own problems, in most cases, without on-site human intervention. The system now also allows remote reset of an inverter to resolve a transitory nuisance problem.

The Hayden/Udall Water Treatment Solar Generation system required a number of visits by TEP personnel in 2004 to fix inverter problems and a data collection battery problem. The amount of corrective visits in 2006 was reduced considerably due to corrections made in 2004 and 2005. However, the inverters installed at this location are reaching the five-year installation period, and will need to be monitored closely in 2007.

During 2006, TEP personnel made 30 visits to small utility, community sited, and TEP utility scale PV systems for corrective maintenance. Most of the repairs required subsequent visits for replacement of inverters or PV modules. In some cases the inspection was a performance check prior to SunShare program acceptance and the repair work was completed by the PV system installer. The 2006 annual specific energy production of the small PV systems in the SunShare program was 10% less than the large SGS crystalline systems, to a certain degree because a SunShare system failure was generally not found until TEP made an inspection. One customer with an inoperative 7 kW DC system for nearly eight months was a large part of the lower annual energy performance of the smaller systems. The problem was discovered during the TEP annual inspection. Small systems need to have the capability to notify the customer when attention is needed, without adding any significant cost to the price of the system.

Two problems with community customer sited locations occurred in the Tucson service territory in 2005 that involved inverter replacement due to failure. At TEP's Irvington Test Yard site, a 20 kW system was out of service for the last quarter of 2005 due to inverter problems. At Springerville, the 20 kW system four-year-old inverter failed and was replaced with a spare that failed two months later.

SunShare equipment in service has exhibited relatively few incidents in 2006, relative to the quantity of systems in service. A table of SunShare, Community and Tucson based Utility-scale corrective maintenance occurrences are shown below:

2006 Corrective Maintenance – Tucson Service Territory

System	Inverter Problems	Module Problems	Meter Problems	Wiring/Misc. Problems
SunShare	9	6	1	4
Community	1	0	0	2
Small Scale Utility	1	0	0	0
Large Scale Utility	1	0	0	24

In all cases above, equipment was either replaced or repaired and returned to service.

The Future

In 2003, TEP installed two additional systems of 2,688 First Solar modules. TEP believes that the issues found with the pre-production modules are being resolved. The 2003 systems are also test units, but have two additional years of development behind them and a much stronger performance standard to meet than the initial two units. Specific annual energy production of the First Solar arrays was actually better than the crystalline arrays in 2004. There are no plans to install any more a-si units at SGS. TEP also installed eight ASE systems in 2004. TEP installed a CIGS system at SGS in 2005. There are two CIGS systems in test in Tucson, alongside similarly sized a-si and crystalline systems. In 2005, two additional test installations, in the 1000+ AC watt size, were installed in Tucson. These systems are made up of various combinations of manufacturer's components and are testing the equipment tolerances to the manufactures performance specifications. This side-by-side testing will provide accurate, comparable data in Tucson's climate. Five additional test systems will be installed during 2007.

TEP will continue to evaluate the reams of solar production data taken during the five years of our solar development program. By this time next year, with more stable solar sensors, TEP should have additional insight into some of the items raised on voltage response with respect to temperature for all thin-film and crystalline materials in test. This data will be shared with inverter and PV module manufacturers and other interested solar industry participants to provide needed feedback for use in developing mature, reliable, predictable and low cost solar consumer products in the future.

PROGRAM CHANGES FOR 2007

The 2007 renewable program includes planned installation of 17 kWp DC at Operating Headquarters in Tucson and an expected minimum of 400 kWp DC in SunShare systems and customer partnering opportunities. TEP will use 2007 to evaluate the new PV offerings while waiting for a temporary increase in PV module prices to decline as manufacturing capacity increases to meet the world-wide demand for PV systems fueled in part by the German solar feed in tariff. Revisions to the current EPS are also under review, which will likely affect the PV installed capacity requirements in 2007 and beyond.

SUNSHARE PROGRAM DETAILS

In 2006, TEP acquired 116 SunShare customers representing 407 kW DC. This amounted to approximately 271, 1.5 kW DC systems. Of those, 91 customers purchased a total of 63 TEP systems under Option 2. Option 3 customers totaled 24 in 2006. Of the original 33 Option 1 systems, 14 did not initially qualify due to inverter, wiring or module problems. After repairs, the 14 were retested and qualified for the SunShare program. Thirteen Option 1 customers converted to TEP's new Option 3 program during 2004 and 2005. All together, there has been a total of 324 customers representing 779 kW DC installed in the TEP SunShare program to date.

SYSTEM PERFORMANCE TESTING

TEP has developed a test program for different manufacturers' small PV systems to gather performance data on their operation in the Tucson environment. This is a two-fold effort: 1) develop operating experience of the different systems to pass on to solar installers, manufactures and our customers; and 2) offer the best performing most economical systems to our Option 2 SunShare customers. This testing provides invaluable information that is not normally available to the homeowners and others interested in investing in solar energy. Presently, we are testing 19 systems, using a combination of 17 different manufacturers' inverters and modules. We are in the process of installing five additional systems of different manufacturers' products.

Below is a table of the systems presently in test.

Test Station	Panel Manufacturer/ Model No.	Cell Type	Inverter Manufacturer	Total Installed Cost per Watt	System kW dc Rating
Inverter/Module					
OH SB/Sanyo 167	Sanyo 167 HIT	Amor/Cryst	SunnyBoy1800	$6.71	1,336
OH Tr/Shell 40/1600	Shell ST40	CIS Thin Film	Trace 1500	$5.78	1,600
OH Tr/Shell 40/1440	Shell ST40	CIS Thin Film	Trace 1500	$6.01	1,440
OH Tr/Shell 40/1440	Shell ST40	CIS Thin Film	Trace 2500	$6.01	1,440
OH TR/Unisolar	Unisolar 64	Tri Junct Sil	Trace 1500	$6.66	1,536
OH GT3.0/BP4170	BP4170	Multi-Crystal	Xantrex GT3.0	$5.00	3,060
OH Tr/BP150	BP SX 150U	Multi-Crystal	Trace 1500	$5.81	1,500
OH SB/Sharp	Sharp 165	Multi-Crystal	SunnyBoy 1100	$5.66	1,320
OH Tr/Sharp	Sharp 165	Multi-Crystal	Trace 1500	$6.23	1,320
OH Tr/Kyocera	Kyocera 158	Multi-Crystal	Trace 1500	$5.79	1,422
OH Tr/BP 140	Bp SX140U	Multi-Crystal	Trace 1500	$5.88	1,400
OH SB/Shell 150	SP 150-PC	Multi-Crystal	SB/2500	$5.06	3,000
OH Sharp/Shell 150	SP 150-PC	Multi-Crystal	Sharp 3500	$5.66	3,000
OH Sharp/Shell150/MST50	MST50	Asi	Sharp 3500	$6.88	1,500
Global Solar Test	GS-45	CGIS	Trace 1500	$7.99	1,440
OH SB/Sanyo 180	Sanyo 180 HIT	Amor/Cryst	Sunny Boy 1800	$6.22	1,440
OH Fronius/Sanyo 180	Sanyo 180 HIT	Amor/Cryst	Fronius IG 2000	$6.53	1,440
OH Tr/MST 50	BP MST 50	Asi	Trace 1500	$4.44	1,500
OH Tr/MST 50	BP MST 50	Asi	Trace 2500	$4.44	1,500
OH Tr/Shell 150	SP 150-PC	Multi-Crystal	Trace 2500	$5.61	1,500
OH Beacon/MST50 (5kW)	BP MST 50	Asi	Beacon M5	$3.94	7,500
OH Trace/Astr Power 165	Asto Power 165	Single Cystal	Trace 2500	$5.75	1,485
OH Trace/Slimline	Global Solar	CIS Thin Film	Trace 2501	$11.30	1,656

Presently we are collecting data manually but as the number of test systems has grown will need to install an automated data logger system. We expect to have this system in place early in 2007.

The following Table on SunShare installations provides specific maintenance data on the systems installed to date.

SUNSHARE INSTALLATION AND MAINTENANCE DATA THROUGH DECEMBER 31, 2006

(Includes all maintenance from SunShare program inception.)

Total DC Installed KW	Date System Is Accepted By TAG (In Service)	Total System Installed Cost	Inverter Problems	Panel Problems	Meter Problems	Wiring or Other Misc. Problems
7.20	02/01/03	$77,426				
6.20	12/01/99	$52,000	X			
4.80	06/15/00	$52,244	X			X
1.44	02/05/01	$11,820	X	X		
2.40	05/04/01	$17,000	X	XXXX		X
4.80	05/30/01	$45,000	X			X
1.29	10/12/01	$9,500	X			
1.50	01/01/02	$10,200		X		
1.68	04/10/02	$12,000	X			X
1.50	06/27/02	$6,000		X		
1.50	07/01/02	$6,500	X	X		X
3.00	07/05/02	$8,500				
1.50	07/12/02	$6,000	X			X
1.50	07/25/02	$6,000	X	X		
1.50	07/30/02	$5,150				
1.50	08/05/02	$4,500				
1.50	08/30/02	$6,000				X
1.35	09/16/02	$5,500				
2.88	10/03/02	$22,000				
1.44	10/05/02	$11,820	X	X	X	X
1.50	10/15/02	$5,100		X		
1.44	10/20/02	$10,500	X			
1.38	10/25/02	$6,500	X			
1.44	11/04/02	$10,820		X		
1.44	11/04/02	$11,820		X		
1.44	11/04/02	$11,820	X	X		X
1.44	11/04/02	$11,820		X		
3.00	11/05/02	$8,500	X	X		
1.50	11/07/02	$6,000				
3.30	12/27/02	$19,582				
1.50	12/27/02	$6,100				
1.50	12/28/02	$4,500				X
2.80	12/31/02	$23,500	X			
1.50	02/06/03	$5,000				
1.44	02/15/03	$11,820	X			X
1.50	03/03/03	$6,000				

Total DC Installed KW	Date System Is Accepted By TAG (In Service)	Total System Installed Cost	Inverter Problems	Panel Problems	Meter Problems	Wiring or Other Misc. Problems
2.40	05/02/03	$8,500	X			
1.50	05/29/03	$8,000		X		
1.50	06/03/03	$5,000		X		
1.50	06/11/03	$5,000				
1.44	08/12/03	$10,500				
1.44	08/12/03	$10,500	X			
6.00	08/15/03	$18,000	XXXX	XXXXXX		
1.44	09/04/03	$10,500				
2.40	09/15/03	$21,000				X
1.38	09/15/03	$6,000				
2.58	09/17/03	$25,000				
3.00	10/15/03	$12,500				X
3.00	10/15/03	$12,500				X
1.44	10/20/03	$12,500	X			
9.00	10/21/03	$56,000				X
1.44	11/04/03	$14,187				
2.58	12/30/03	$23,000				
2.40	01/01/04	$21,000				
4.20	01/01/04	$24,352				
1.50	01/20/04	$6,200		X	X	
1.50	02/04/04	$6,500				
1.44	02/05/04	$10,500	X			
1.50	03/09/04	$6,500				
1.50	03/09/04	$6,500	X			
1.44	03/10/04	$10,700				
7.00	03/15/04	$75,000	X	X		
1.20	04/08/04	$10,000				
1.44	04/08/04	$10,705				
1.49	04/08/04	$10,000				
1.20	04/08/04	$10,000				
3.00	04/08/04	$10,500	X			XX
3.00	04/08/04	$9,500				
1.44	04/08/04	$15,000				
1.44	04/08/04	$15,000				
1.44	04/09/04	$10,700				
1.44	04/12/04	$8,500		X		
3.00	04/14/04	$14,000				
1.50	04/14/04	$5,000				
1.54	04/30/04	$10,000				
1.44	05/20/04	$11,090				
1.50	05/20/04	$10,835				X
3.00	05/20/04	$7,200				
3.00	05/20/04	$7,000		X		

Total DC Installed KW	Date System Is Accepted By TAG (In Service)	Total System Installed Cost	Inverter Problems	Panel Problems	Meter Problems	Wiring or Other Misc. Problems
1.44	05/24/04	$10,705				
1.44	05/24/04	$10,705				
1.44	05/24/04	$10,705				
1.50	06/01/04	$10,835				
1.50	06/01/04	$10,835				X
1.50	06/02/04	$4,500				
1.44	06/02/04	$10,705	X			
1.50	06/03/04	$10,834				
1.44	06/03/04	$10,705				
3.00	06/26/04	$11,700				
3.00	06/28/04	$10,700				
3.20	07/09/04	$8,625				
1.50	07/15/04	$10,835				
1.44	07/15/04	$10,820	X			
1.44	07/15/04	$10,820				
1.44	07/15/04	$10,705				
1.44	07/15/04	$10,700				
1.44	07/15/04	$10,805	X			
1.50	07/20/04	$6,200				
3.20	08/18/04	$9,700				X
1.29	09/01/04	$10,000				
5.94	09/15/04	$18,765				
3.00	09/20/04	$6,700	X			
1.60	09/24/04	$10,800				
3.00	10/01/04	$6,700				
1.44	10/20/04	$10,835				
3.10	11/01/04	$12,850				
1.50	11/03/04	$10,835				
3.00	11/18/04	$16,000				
3.20	12/01/04	$7,300				
1.44	12/02/04	$10,835				
3.2	12/09/04	$9,700				
1.16	12/31/04	$12,885				
3.20	01/18/05	$11,325				
1.50	02/14/05	$6,000				
1.40	02/15/05	$10,835		X		
1.44	02/24/05	$10,835	X			
1.5	02/25/05	$10,835				
6.40	03/01/05	$23,600				
3.20	03/08/05	$11,300				
1.60	03/11/05	$10,835				
3.00	04/08/05	$14,700				

Total DC Installed KW	Date System Is Accepted By TAG (In Service)	Total System Installed Cost	Inverter Problems	Panel Problems	Meter Problems	Wiring or Other Misc. Problems
1.60	04/11/05	$8,436				
3.20	04/19/05	$7,600	X	X		
4.80	05/01/05	$33,200				
2.40	05/01/05	$14,600				
1.5	05/09/05	$7,380				
2.00	05/09/05	$10,500				
2.80	05/27/05	$17,500				
1.50	06/14/05	$10,835	X			
1.50	06/14/05	$10,835				
1.60	06/21/05	$10,835				
1.40	06/21/05	$18,835				
1.50	06/28/05	$11,219				
3.20	06/29/05	$11,800				
3.00	07/01/05	$11,800				
1.50	07/15/05	$10,835				
3.2	07/15/05	$7,300				
3.20	08/18/05	$14,486				
5.10	08/19/05	$26,644				
3.00	08/29/05	$10,800				
1.50	08/30/05	$6,600				
3.20	09/02/05	$9,600	X			
3.20	09/02/05	$10,200				
3.00	09/15/05	$11,300				
1.50	09/15/05	$6,500				
3.20	09/15/05	$11,300				
1.60	09/16/05	$10,835				
6.00	09/16/05	$24,070	X			
1.50	09/16/05	$6,500				
7.65	09/22/05	$29,100				
3.20	09/23/05	$9,600				
3.00	09/28/05	$11,300				
3.00	10/07/05	$14,000				
3.20	11/04/05	$13,000				
3.00	11/18/05	$11,050				
1.50	11/19/05	$10,835				
3.00	12/02/05	$8,150				
1.5	12/20/05	$10,000				
3.20	01/09/06	$10,100				
1.60	01/10/06	$10,835				
1.60	01/18/06	$10,835				
1.60	01/18/06	$10,835				
6.00	01/20/06	$25,000				

Total DC Installed KW	Date System Is Accepted By TAG (In Service)	Total System Installed Cost	Inverter Problems	Panel Problems	Meter Problems	Wiring or Other Misc. Problems
3.00	01/30/06	$10,300				
1.50	01/31/06	$6,300				
1.50	02/01/06	$7,700	X			
3.00	02/03/06	$9,600				
1.50	02/06/06	$10,835				
1.60	02/06/06	$10,835				
1.50	02/13/06	$5,600				
1.60	02/20/06	$6,844				
3.20	02/20/06	$10,020				
2.46	02/24/06	$22,073				
3.00	02/24/06	$9,600				
1.60	02/24/06	$10,835				
3.20	03/10/06	$11,300				
1.50	03/10/06	$7,000				
3.00	03/14/06	$7,300				
1.50	03/14/06	$6,200				
1.92	03/14/06	$6,145				
3.20	03/14/06	$11,800				
1.60	03/15/06	$10,800				
10.20	03/17/06	$70,000				
4.60	03/21/06	$12,300	X			
3.00	03/30/06	$9,300				
1.60	03/30/06	$11,640				
4.59	04/19/06	$14,300				
1.92	04/19/06	$11,500				
1.60	04/19/06	$10,835				
3.20	04/24/06	$11,475				
1.53	05/09/06	$10,835				
1.60	05/19/06	$10,835				
3.00	05/19/06	$8,769				
3.00	05/19/06	$12,000				
3.00	05/19/06	$11,300				
1.53	05/23/06	$6,250				
3.20	05/23/06	$12,500				
3.00	05/23/06	$11,000				
1.53	06/01/06	$12,000				
1.60	06/01/06	$9,427				
1.53	06/21/06	$6,200				
1.53	06/21/06	$6,000				
1.53	06/21/06	$6,200				
1.53	06/21/06	$6,200				
12.00	06/29/06	$60,000				

Total DC Installed KW	Date System Is Accepted By TAG (In Service)	Total System Installed Cost	Inverter Problems	Panel Problems	Meter Problems	Wiring or Other Misc. Problems
3.00	07/14/06	$7,000				
1.53	07/14/06	$12,324				
1.60	07/14/06	$10,835				
1.53	07/14/06	$10,835				
1.53	07/14/06	$10,835				
3.15	07/24/06	$12,300				
3.15	07/24/06	$12,500				
3.00	07/25/06	$11,800				
3.15	07/25/06	$11,600				
6.40	07/25/06	$15,891				
3.00	07/25/06	$11,050				
6.30	08/03/06	$24,236				
1.60	08/09/06	$10,837				
1.53	08/09/06	$6,000	X			
3.00	08/10/06	$11,300				
1.53	08/10/06	$6,500				
9.18	08/11/06	$27,400				
1.53	08/11/06	$6,500				
1.58	08/11/06	$6,400				
3.15	08/25/06	$12,000				
3.00	08/25/06	$11,300				
3.15	08/25/06	$11,300				
1.58	08/25/06	$6,200				
1.60	08/31/06	$10,835				
1.53	08/31/06	$10,835				
1.53	08/31/06	$10,835				
1.53	08/31/06	$6,500				
3.00	08/31/06	$11,300				
1.60	09/08/06	$10,835				
1.53	09/08/06	$10,835				
6.12	09/14/06	$23,300				
1.53	09/14/06	$6,500				
3.00	09/21/06	$11,000				
3.00	09/21/06	$15,629				
1.60	10/03/06	$10,835				
1.53	10/04/06	$6,700				
6.12	10/04/06	$21,800	X			
3.00	10/09/06	$10,300				
3.00	10/09/06	$10,300				
3.00	10/11/06	$11,300				
3.00	10/11/06	$11,300				
3.00	10/12/06	$9,900				

Total DC Installed KW	Date System Is Accepted By TAG (In Service)	Total System Installed Cost	Inverter Problems	Panel Problems	Meter Problems	Wiring or Other Misc. Problems
3.00	10/18/06	$12,000				
3.00	10/18/06	$11,200				
9.32	11/02/06	$33,550				
1.53	11/02/06	$6,650				
3.00	11/03/06	$9,800				
3.00	11/03/06	$11,300				
3.00	11/03/06	$12,000				
3.00	11/08/06	$11,300				
3.15	11/08/06	$10,300				
3.00	11/09/06	$11,300				
1.58	11/15/06	$9,300				
6.30	11/15/06	$22,100				
3.00	11/15/06	$10,350				
2.04	11/15/06	$8,419				
3.10	12/11/06	$10,500				
1.53	12/13/06	$6,500				
3.00	12/13/06	$10,300				
3.00	12/13/06	$12,000				
3.00	12/13/06	$12,000				
3.15	12/14/06	$11,300				
3.00	12/15/06	$9,950				
3.15	12/15/06	$11,300				
3.15	12/19/06	$9,750				
1.58	12/20/06	$10,800				
1.58	12/20/06	$6,500				
2.52	12/30/06	$3,400				